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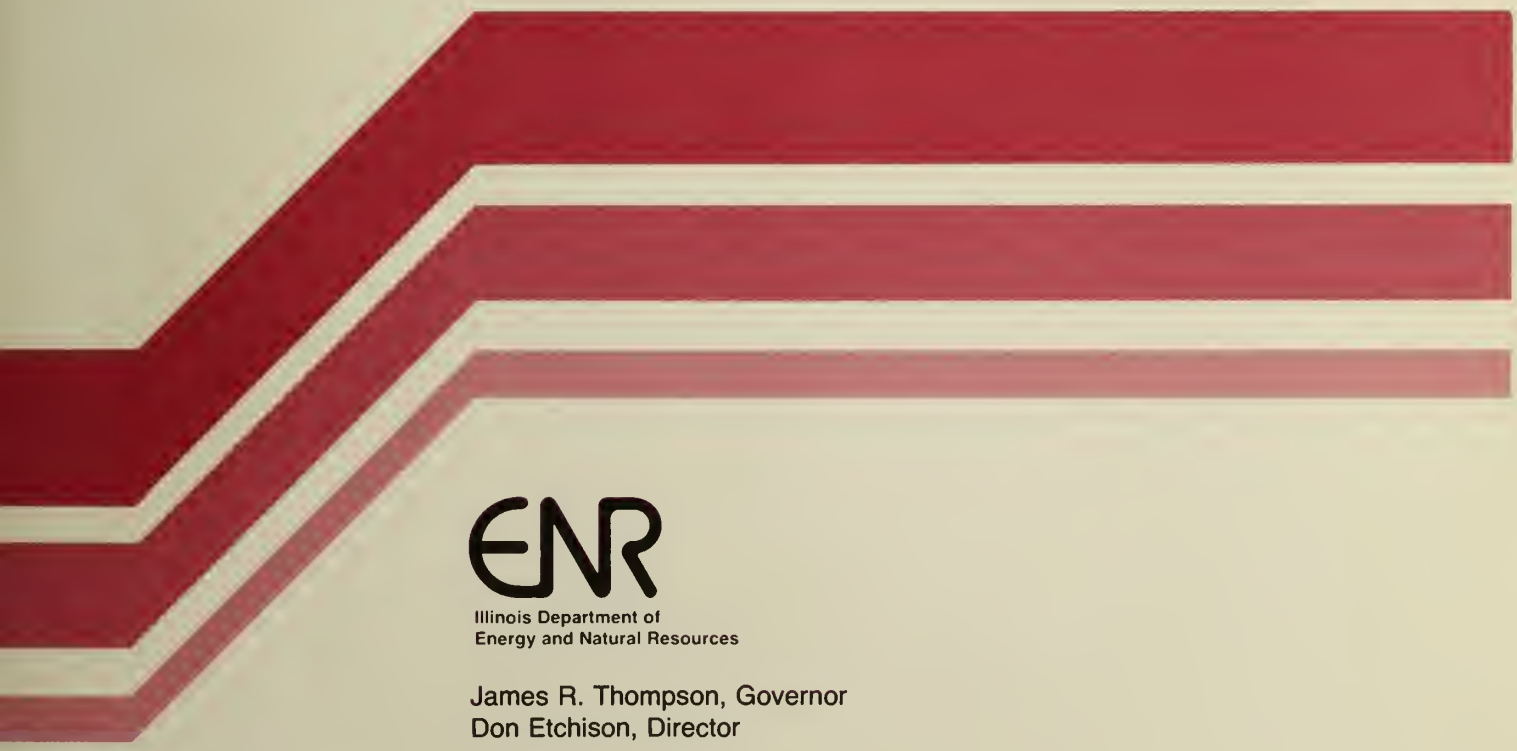

Illinois Department of
Energy and Natural Resources

James R. Thompson, Governor
Don Etchison, Director

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RURAL ENERGY USE STUDY

FOR

WEST-CENTRAL ILLINOIS

Prepared by

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James R. Thompson, Governor
State of Illinois

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[1]Prepared under contract ER-75 with the Illinois Department of Energy and Natural Resources, 325 W. Adams, Springfield, Illinois 62704-1892 as project number 85/1010 to the Institute of Technology Assessment, 6th and Capitol, Springfield, Illinois 62701.

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NOTE

This report has been reviewed by the Department of Energy and Natural Resources (ENR) and approved for publication.

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Solid and Hazardous Waste	- White	Olive
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Noise Management	- Buff	Orange
Energy	- Cherry	Red
Information Services	- Canary	Yellow

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Thomas Heavisides: Illinois Department of Energy and Natural Resources

Terry Miller: Illinois Department of Energy and Natural Resources

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Lester W. Aeilts, Manager, Western Illinois Electrical Coop, and staff

Thomas H. Moore, Coordinator, Illinois Statewide Power Cooperatives, and staff

PROJECT OVERVIEW

Rural Energy Use in West-Central Illinois is a study conceived of and funded by the Illinois Department of Energy and Natural Resources (IDENR) as a part of an ongoing strategic planning effort to design and implement a methodology for developing effective policy and programs. The IDENR report, Illinois Energy Plan Vol. VI (December 1983) discusses on a statewide aggregate level the important link between energy and the economy. According to this report, "after industry, agriculture is the sector in which energy efficiency is projected to have the strongest positive economic impact for Illinois." While the Illinois Energy Plan presented a macro level examination of an energy efficient scenario on a statewide basis, additional research and analysis is needed to develop and effectively market programs and develop policies on a local level.

Agriculture's importance to the economies of both Illinois and the nation would be difficult to overstate. Much attention has been given to the various problems facing agriculture recently, but the production expenses associated with energy demand has received little attention, although expenditures for energy-including the imbedded energy in fertilizers and agricultural chemicals-represent the largest of the variable production costs in farming. In addition, a requisite of any production process is the energy input; this is especially critical to agriculture, which is involved with the production of goods of an essentially biological nature and which are unprocessed relatively low value commodities.

Agricultural activity in Illinois can esentially be characterized on a regional basis; therefore, it was decided to approach the rural sector by breaking it down into geographical regions. The Western Illinois region was chosen for several interrelated reasons:

- Extreme Western Illinois is identified by the Illinois Department of Commerce and Community Affairs as an economicallly depressed region.

- Three Rural Electric Cooperatives belonging to the Western Illinois Power Cooperative system and one belonging to the Soyland system correspond almost perfectly to the regional demarcation of West Central Illinois, simplifying sample selection.

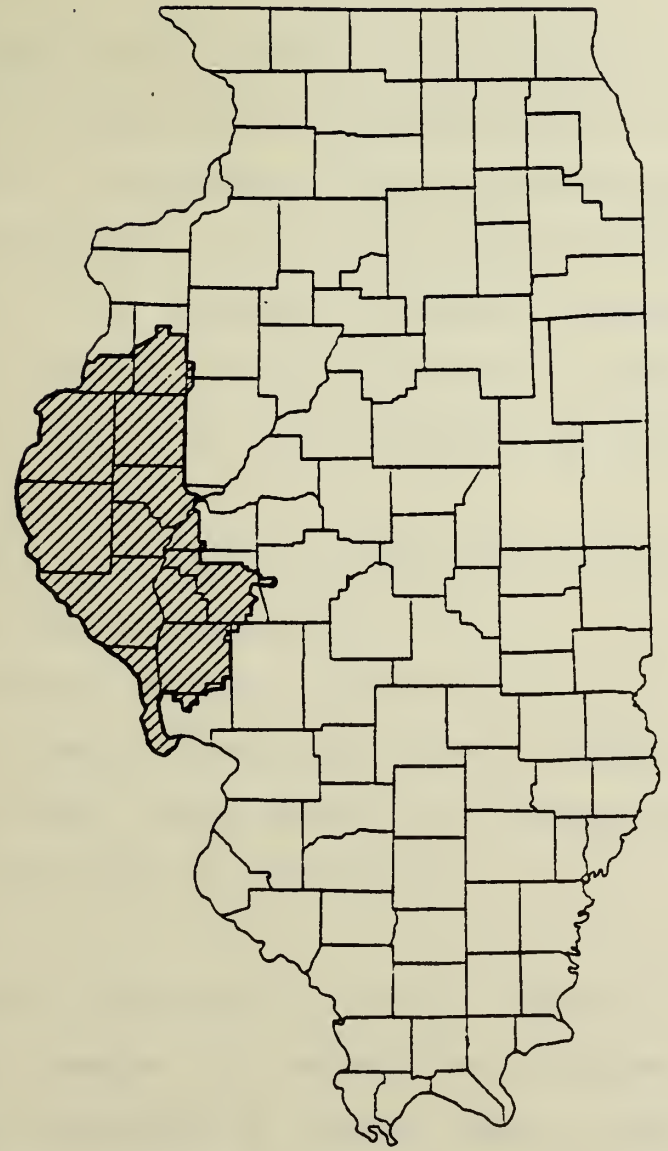
- Western Illinois Power Cooperative and Soyland Cooperative have a contractual investment with Illinois Power in the financially troubled Clinton Nuclear Plant, which may have severe impacts on the region.

The Institute of Technology Assessment (ITA) was contracted to assist in the design of a suitable survey instrument and to conduct the data collection. The project managers for IDENR worked in close cooperation with ITA to ensure the result would meet the Department's informational needs. It was discovered that exact input/output data could not be obtained due to a variety of obstacles, primary of which was the reluctance of the farming respondents to provide output or income information. Much valuable descriptive information was obtained, however, on both rural farm and non-farm (residential) energy consumption.

Rural Energy Use in West-Central Illinois - Volume I is a descriptive report that summarizes the energy use data collected in the region. It is readily apparent from the data, agriculture in Western Illinois has major dependence on petroleum energy. While agriculture has a fundamental dependence on electricity it cannot be readily substituted for petroleum in the various end-uses. The rural/ag economy is at a crossroad with respect to future directions. It is our view that the direction is very dependent on the choice of energy for the various end-uses. Therefore the stability of the region is dependent on the availability of affordable energy sources and the ability to substitute alternatives. A follow-up study, Volume II, will recommend policy options and strategies for alternatives to the current fuel choices for the various end-uses.

Tom Heavisides, Project Manager
Terry Miller, Project Manager

Rural Energy Use Study For West-Central Illinois



SUMMARY

This project was undertaken by the Illinois Department of Energy and Natural Resources (IDENR) to study the energy use patterns of the rural population of West Central Illinois. The sample population for the study was composed of members of four rural electric cooperatives.

The study was conducted by the Institute of Technology Assessment, Inc., with the assistance and cooperation of the Association of Illinois Rural Electric Cooperatives and the officers and staffs of the Adams Electric Cooperative, The Illinois Rural Electric Co., McDonough Power Cooperative, and Western Illinois Electrical Cooperative. The professional staff of IDENR contributed significantly in the conduct of the project. The study was descriptive in nature and was designed to:

1) develop and test a methodology for sampling energy use patterns in selected populations,
2) describe energy use patterns of the residential and farming populations of rural West-Central Illinois, and
3) determine major energy use changes which have taken place in that population in recent years.

A major conclusion of this study is that there have been significant changes in energy use patterns in the population of West-Central Illinois in recent years. Five times as many changes occurred during 1983/84 as were made in the period 1975/76. These changes all appear to involve shifts which conserve energy or reduce costs:

1) There has been a significant shift away from Liquid Propane (LP), oil, and electricity toward wood and natural gas (NG) as primary heating fuels. A similar shift has occurred in hot water heating, in which the switch is generally from electricity to LP. Nearly all changes which include dropping electricity as a heating source have occurred since 1980. While the shifts have been pronounced in recent years there still remains considerable latitude for the the trend to continue, particularly in the area of water heating. Over half of the survey respondents still use electricity to heat water but at least 40% and perhaps as many as 80% (20% - 40% of the entire customer population) could easily shift to gas water heating.

2) There has been a significant substitution of secondary heating methods such as space heaters and wood stoves for traditional centralized primary sources. Wood has become the primary heating source for nearly one-fifth of the respondents.

3) Many respondents have undertaken measures to conserve energy. While these measures include weatherization techniques they also include the reduction of living space by closing off rooms. There has also been a significant reduction in the use of air conditioning either by substituting fans or through non-use.

A fundamental purpose of this study was to identify energy use patterns in the West-Central Illinois region. Section 2 of this study discusses residential use patterns which are summarized in Table C. Section 3 discusses farm energy use patterns, summarized in Table K.

Another fundamental purpose of this study was to develop and test a methodology for examining energy use patterns on a regional basis. We feel this effort was successful. Many techniques for data collection and analysis were developed and tested and some have proven effective. Most important however is that the entire process worked well as a means of gathering and evaluating information about actual energy uses in an important section of the State of Illinois. The methodology is discussed in detail in Section 5.

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Farm Energy Use	DATA Vol. 3 (pp.278-470)

1. INTRODUCTION

1.1 Background and Purpose of the Project

This study of rural energy use in West-Central Illinois had two goals. The first was to develop and test a methodology for successfully conducting a regional study of energy use patterns. The second was to determine the actual uses and sources of energy in the selected study population.

The survey and analysis was done during the summer and fall of 1985 by the Institute of Technology Assessment, Inc., under a contract with the Illinois Department of Energy and Natural Resources. Since the study concentrated on the uses and sources of energy by a rural population in an agricultural economy, members of rural electric cooperatives were used as the study sample. It was assumed that customers of the cooperatives were representative of the larger rural population. The work was done with the assistance and cooperation of the Association of Illinois Rural Electric Cooperatives and the officers and staff of the Adams Electrical Co-Operative, Illinois Rural Electric Co., McDonough Power Cooperative, and Western Illinois Electrical Cooperative.

The study covers the ten West-Central Illinois counties of McDonough, Adams, Schuyler, Brown, Pike, Scott, Morgan, Calhoun, Greene and Hancock and parts of three others. The area lies generally between the Illinois and Mississippi Rivers and is primarily rural and agricultural. The economy, population, land configuration and

agricultural practices are all relatively homogeneous.

1.2. Scope of the Project

A short time schedule and restricted funds limited the project to a survey questionnaire of a representative sample of electric cooperative customers and an analysis of the responses. Much of the effort went into selecting the sample, simplifying the questions, determining phrasing that would be most familiar, and assuring that the questions covered the full range of energy use practices and changes actually taking place and attempting to maximize the number of questionnaires answered.

The work was done in close cooperation with DENR staff. Literature was reviewed and conferences were held with cooperative directors and staff to determine customer groupings and rates, use data and patterns, billing information and the existing capability to normalize usage. Lengthy open-ended discussions were held with a small number of customers in their homes to explore fully their energy use patterns and practices and to determine the phrasing of questions that would elicit the fullest responses.

On the basis of the information gathered, three test questionnaires were constructed and sent to a small randomly selected number of rural electric cooperative customers. The reaction and response rates to those questionnaires prompted ITA in consultation with DENR to shorten and simplify the survey instrument.

The questionnaire was mailed to 589 randomly selected customers of the four electrical cooperatives in the study area. The total membership of the four cooperatives was 19,000. A second mailing, a telephone follow-up, and the opportunity of participating in a cash award were all used to increase the return of questionnaires. Each respondent was also asked to sign a release giving his or her cooperative permission to release their electrical usage and billings to ITA.

1.3. Conduct of the Study

The study was conducted to maximize the usefulness and reliability of the information obtained. The eight-page questionnaire consisted of 13 demographic and residential energy use questions and 17 energy use questions directed specifically at farming operations. Of the 589 people in the sample, 353 (60%) returned questionnaires with answers that were sufficiently complete to be usable. Of those who returned questionnaires, 136 (38%) filled out some part of the farm questions. Only 117, however, were sufficiently responsive to the farm energy questions to be included in the quantitative analysis of the farm energy use data.

The response to the request for release of electrical billing data from the cooperatives was excellent. Of the respondents, 310 (88%) signed the release which resulted in obtaining usable 1984 residential electric usage records for 272 customers. (Some who signed the release

had only their farms but not their residences in the cooperativ territory or had recently either moved into or out of it, resulting i less than complete usage data for 1984).

A full quantitative analysis was performed by ITA of all of th information supplied. Correlations between energy use patterns an changes with demographic factors were determined. The information o residential energy usage was relatively more complete and th information relatively more reliable and consistent than the informatio obtained on agricultural energy usage.

Some clear trends emerged from the analysis and an attempt was mad to assess their significance. Of particular importance is the shiftin away from electricity as a primary heating fuel and as a fuel fo heating water. The agricultural data present a fairly clear picture o the relative importance of livestock, row crops, wheat and hay, and o the proportion of grain drying done with various fuels. Good data wer obtained on fertilizer.

1.4. The Report

Section 2 describes the residential energy use patterns of th population. Section 3 describes the energy used in agriculture Section 4 analyzes the changes in energy use patterns which appear to b taking place.

Section 5 deals specifically with the design, development, an

application of the methodology used in the study, and includes a demographic description of the sample.

2. PROFILE OF RESIDENTIAL ENERGY USE

The study focused on three primary residential end uses of energy: home heating, home cooling, and water heating. There was no attempt in the questionnaire to identify directly the amount and type of energy used for lights and household appliances. That information was derived in broad outline by correlating information from the survey with electrical usage numbers released by the cooperatives.

2.1. Home Heating

Although gas (both LP and natural) is the largest source of primary heating for homes in rural West-Central Illinois, nearly one in every five households uses wood as the primary source of home heating -- more than use either electricity or oil.

In addition to a primary heating system, approximately 60 percent of the households also use a secondary source of heat. This secondary source typically is designed to heat a space smaller than the whole house, e.g., one room, and often is portable and can be moved from place to place in the home as the need arises.

2.1.1. Primary Heating Fuels and Systems

Gas is the fuel used by 57 percent of the households, for primary home heating. Wood is the second most common primary fuel, used by 19

percent of the households; followed by electricity and oil, each c which is used by approximately 11 percent of the households (See Tables 1 and 2).

2.1.2. Secondary Heating Fuels and Systems

58 percent of the households reported the use of at least on secondary source of heat. Of those who use secondary sources approximately one-third use kerosene space heaters, another third us wood stoves or fireplaces, with most of the remaining third using eithe electricity or gas as a secondary fuel (See Tables 3 and 4).

One-fourth of the households reporting a secondary source of hea used two or more secondary sources. For the purpose of constructin Table 4 on secondary fuels, if a respondent reported the use of both kerosene space heater and an electric space heater each fuel wa credited with half a household.

2.1.3. The Decentralization of Heating

The examiner is struck quickly with the fact that people repor using what is normally considered a "central" heating system (e.g., a electric furnace) as a "secondary" source of heat, while reporting wha is normally considered a "secondary" source (e.g., LP or NG spac heaters) as their primary heating system. The switch is substantial an is reported by one out of every six respondents. 18.7 percent of th

households use a central system as a secondary source of heat, while 16.1 percent use some kind of a stove or space heater for their primary source of heat.

One of the first reactions to increased fuel costs appears to be to heat less space, close off rooms and shut down central heating systems. This reaction is most pronounced in households with electric heating systems (See Table 3). Even though a more expensive fuel may be used the total cost is less because the space heated is reduced.

2.2. Home Cooling

Approximately one-third of the households in rural West-Central Illinois have no air conditioning, a third use central air conditioning, and a third use window air conditioning units (See Tables 5 and 6).

Households with central air conditioning use two to four times more electricity for cooling than households with window air conditioners (See Table A, below). Approximately three of every four households that use window air conditioning have only one unit indicating that they cool only a portion of the home.

2.3. Water Heating

Rural West-Central Illinois households split almost evenly between electricity and gas in their choice of fuel to heat water. No other

fuel source is significant. Almost all households have a hot wate heater (See Table 7).

It is not surprising that 91.9 percent of the households that hea with electricity also heat water with electricity. Of the household that heat with gas, however, 38.7 percent heat water with electricity This represents 42.6 percent of the entire electric hot water heatin market that could shift from electricity to gas at a cost of only th price of a new water heater. Of the households that heat with oil, 7 percent use electricity for heating water. Of those that use wood t heat the home, 51.6 percent use electricity to heat water (See Table 8)

2.4. Household Use of Electricity

Usage of electricity by households in rural West-Central Illinoi was determined by using customer billing information. Over 80 percen of the respondents allowed release by the cooperatives of thei electricity use.

The average use by all customers in 1984 was 11,248 + 530 KWH (Se Tables 9-10). By comparing billings with reported end uses o electricity, i.e., home heating, air conditioning, heating hot water, i was possible to arrive at the relative amounts of electricity that go t each of those end uses. The results are given in Table A.

----------TABLE A----------

Average KWH Used by a Household for Selected End Uses

End Uses of Electrical energy	Average KWH Used in 1984
Basic lighting and appliances (no electric heating, water heating or A/C)	5,500 to 6,500
Hot water heating	1,500 to 2,500
Window air conditioning	1,100 to 1,500
Central air conditioning	2,000 to 6,000
Home heating	9,000 to 11,000

Note: The method of calculation and the source for these numbers are discussed in Note 1 to Section 2.

Detailed analysis of the data suggests that households which use electricity for fewer purposes tend to conserve on all their uses of electricity. Conversely, as households add uses for electricity they tend to be less conservative in the use of any particular appliance. A more detailed appliance study would be needed to confirm or reject this conclusion, but it seems intuitively correct because if one is concerned enough about costs to reduce the number of different kinds of usages for electricity, one also is likely to be careful about how much one "turns on" what is left.

As shown by the results summarized in Table B, below,farmers on the average used 4500 to 5000 more KWH in 1984 than non-farmers. This is true despite generally similar patterns by farmers and non-farmers in their electrical usage for residential purposes. (Note: the residential data presented in the DATA volumes, pp. 1-140 are for all respondents, and those on pp. 141-277 are for farmers only. These in general show

close agreement). We conclude, therefore, that the 4500 to 5000 KW average difference between farmers and non-farmers represents farm us on the residential meter. (Some farmers have separate meters for som or all of their farming operations; many have a single meter for al their electric uses, however). The 1984 electrical usage by selecte categories of customers were as follows in Table B.

----------TABLE B----------

Electrical Usage by Selected Categories of Customers

Type of Customer	Average KWH Use in 1984
Non-farm households without electrical primary or secondary home heating, hot water heating or air conditioning.	5,764 ± 659 (a)
Farm households without electrical primary or secondary home heating, hot water heating or air conditioning.	10,123 ± 1,491 (b)
All non-farmers.	9,381 ± 581 (c)
All farm households.	14,173 ± 948 (d)
All households.	11,248 ± 530 (e)
All households that used electricity for primary source of home heat.	21,993 ± 2,299 (f)
All households that did not use electricity as a primary or a secondary home heating fuel.	9,837 ± 498 (g)

(a)-(g) Sources for these numbers are given in Tables 11-18, except (e) which is from Table 9.

When the average KWH values in Table A are extended by th proportion of households that use electricity for each particular en use (Tables 2, 5, and 7), the total residential usage of electricity i

rural West-Central Illinois breaks down approximately as follows: 60 percent of the electricity used within homes goes for basic light and appliances, 10 percent goes to heat hot water, and the remaining 30 percent is split between cooling the home in summer and heating the home in winter with a somewhat larger share going to cooling than to heating.

2.5. Household Use of LP and Natural Gas

Gas (LP and natural) rivals electricity as a source for heating water and outdistances electricity by a five to one margin as the choice for home heating.

251 respondents report use of gas (LP or NG unspecified) for home use (See Table 19), 146 respondents reported an average use of 1049 ± 65 gallon of LP in 1984 (See Tables 20-22), while, 161 respondents reported dollar figures expended for LP in 1984 indicating that they used LP (See Tables 23-25). There were 171 respondents in all who provided dollar amounts, gallons or both for LP (See Table 26). This represents the lower limit to the number of LP users in the sample. Of the remaining 80 (251-171), 32 indicated natural gas use either in amount or dollar expended or both (See Table 27). If the ratio of natural gas to LP users in the 48 undifferentiated gas users approximates the ratio of users among the 203 who specified use (171 LP users ± 32 natural gas users) then it is probable that the number of LP users in the sample is 211 ± 7 and that the number of natural gas users is 40 ± 7 (60% and 11% of the sample respectively).

Up to 20% of the LP usage reported by farmers in response to Question 11 (which requested household use in 1984) was probably used for farm operations (See Note 2 to Section 2). The most probable average amount of LP for household use is that reported by the non-farmers, 956 ± 81 gallons, at an average cost of $743 ± $51 (See Tables 28-29).

The average natural gas use reported was 1167 ± 163 therms at a cost of $664 ± $60 (See Tables 30-33).

In summary, we find that (60 ± 2)% of the population use an average of 956 ± 81 gallons LP, equivalent to 88 ± 7 mmBTU. Multiplying the average energy used by the percent of sample using LP, one obtains an energy intensivity index of 53 ± 6 mmBTU (See Section 5.5.2. for discussion of the energy intensivity index). The corresponding figures for natural gas are (11 ± 2)% of the population using an average of 116 ± 163 therms, or 117 ± 16 mmBTU, and an energy intensivity index of 13 ± 4 mmBTU. The total energy intensivity index for gas (LP or natural) is 66 ± 7 mmBTU.

The data show that those respondents who use LP both as a primary heat source and to heat water pay about 10 percent more for LP than those who use LP for primary home heat but not for water (See Tables 34-35). The estimated amount of LP used for hot water heating is 100 gallons or 9 mmBTU per year. As explained in Note 3 to Section 2, the margin for error in this result is necessarily very large; the average amount used for water heating could easily be as much as twice this figure, 200 gallons LP or 18 mmBTU. If 100 gallons is accepted as the

fuel for water heating, the average home heating use is about 860 gallons or 80 mmBTU.

An average use of 9-18 mmBTU of LP for water heating corresponds reasonably well to the 1500-2500 KWH used for electric hot water heating, if one allows for a 60-70% efficiency in delivering gas BTU's to the water. The correspondence takes on added significance when the costs of heating water by LP or electricity are compared. At a price of $.75 a gallon for LP, the cost of 100 gallons of fuel for the year is $75. At $.12 a kwh, the cost of 1500 kwh to heat water for the year is $180 - over twice as much as the cost for LP. (If BTU values are compared directly, again assuming 70 percent efficiency for LP, the price advantage of LP over electricity is more than three to one.)

2.6 Household Use of Other Fuels: Oil, Kerosene, Wood and Coal

The information obtained about the usage of oil, kerosene, wood and coal is not as detailed as the information obtained about the use of electricity and LP. A sense of the amount and proportion of the usage can, however, be obtained from the data.

Some 14.4 percent of the households reported use of oil in 1984. The average amount of oil used in these households during the year was 545 ± 60 gallons (76 ± 8 mmBTU) at an average reported cost of $577 ± $61 (Tables 36-39).

Less than a third of the 70 households that reported using kerosene

space heaters as a heat source provided usage numbers. Those that did used an average of 66 ± 14 gallons (9 ± 2mmBTU) at an average cost fo the year of $97 ± $22 (Tables 40-43). The energy intensivity index i 1.8 ± 0.4.

135 households (38%) reported using wood heat (plus 8 more who use fireplaces without inserts), 97 of which reported wood usage numbers The average of those households used 7.0 ± 0.6 cords of wood during th year. Those that paid for wood paid an average $213 ± $34 during th year. Many reported cutting the wood themselves and paying no pric (See Tables 44-46). At an average heat value of 20 ± 2 mmBTU/cord, th average wood user used 140 ± 26 mmBTU. The average value of 140 mmBT is 60% greater than that for LP and 84% greater than that for oil. Thi may be due to a lower efficiency in using wood or in a systemati overestimate of the number of cords of woods. The energy intensivit index corresponding to an average use of 140 mmBTU is 53 ± 10 mmBTU.

Coal has almost disappeared as a source of energy in residences i rural Western Illinois. Less than 1 percent of the households reporte using coal. Usage ranged between 2 and 18 tons during 1984 (Table 47).

2.7. Summary of Household Energy Use

Table C summarizes the percentage of the sample that used eac major fuel in 1984, the average amount paid for that fuel by thos reporting, the average quantity of fuel used and its BTU equivalent, an energy intensivity index.

----------TABLE C----------

Summary of Major Fuels Use and Energy Intensity Index

	Electricity	LP	NG	Oil	Wood
User percentage	100%	60% ± 2%	11% ± 2%	14%	38%
Ave. Cost	*$1138 ± 89	$743 ± 51	$664 ± 60	$577 ± 61	**$213 ± 34
Ave. Use (units)	***9381 ± 581 (KWH)	956 ± 81 (gallons)	1167 ± 163 (therms)	545 ± 60 (gallons)	7.0 ± 0.6 (cords)
Ave. mmBTU	32 ± 2	88 ± 7	117 ± 16	76 ± 8	140 ± 26
E.I.I.****	32 ± 2	53 ± 6	13 ± 4	10.9 ± 1.2	53 ± 10

Notes: * Based on Table 48, respondents' figures.

** Over half of users pay no price.

*** Based on Table 13, Coop figures.

**** The Energy Intensivity Index is defined and explained in Section 5.5.2.

Notes to Section 2

Note 1

Table A is obtained by finding the differences between pairs of numbers from Tables 49-57. To obtain each difference, two of three variables are kept the same, and the third is varied. The numbers subtracted from each other are always the means from the tables, ± the standard deviations of these means. The variables are:

Electric heat (PRI = primary electric heat; or NO = neither primary nor secondary electric heat); Electric hot water (YES or NO); Air-conditioning (NO; window; central). "All" means that respondents were included regardless of farmer status.

Thus, for example, NO,NO,Central = 10059 ± 1115 from Table 55
and NO,NO,NO = 7719 ± 798 from Table 57
combine to give
Central A/C = 2340 ± 1371 KWH

Note, however, that several other measures for the KWH expended on central air-conditioning are available, for example:

NO,YES,Central = 12772 ± 940 from Table 52
minus NO,YES,NO = 9733 ± 1404 from Table 54
give Central A/C = 3039 ± 1690 KWH

Note 2

Question 11 called for the amount of fuel used in 1984 for household use. Tables 58 and 28 show the averages reported by 70

farmers and 76 non-farmers to be 1150 ± 104 gallons and 956 ± 81 gallo
respectively. Tables 59 and 29 show that 72 farmers paid an average
$858 ± $78 for household LP while 89 non-farmers paid an average of $7
± $51 for household LP. The average gallons reported by farmers exceed
that of non-farmers by 20%. The reported cost to farmers exceeded th
of non-farmers by 15%. It appears that the difference of 194 ± 1
gallons or $115 ± $93 is attributable to farm use included in t
responses to Question 11 by at least some farmers. This amounts to
much as 15-20% of the amount reported. The best available mean f
household use of LP only is the 956 ± 81 gallons reported by t
non-farmers.

Note 3

The uncertainty in the difference of two uncertain numbers becom
very large indeed. To obtain a dollar figure attributable to LP f
water heating we subtracted the mean in Table 35 from that in Table 3
(923 ± 62) - (837 ± 67) = 86 ± 91, where the standard error in t
result is the square root of the sum of the squares of the errors of t
mean.

Use was made of the dollar figures rather than of the gall
figures because the cost figures are more reliable. A comparison
Tables 21 and 24 and the accompanying histograms (Tables 22 and 2
shows a smaller scatter of the cost figures supplied by respondents th
in the gallon figures. Moreover, a larger number of respondents kn
their cost than knew the gallons purchased.

The LP cost attributable to water heating is $86 ± $91, about 1

of the average total LP purchases reported. Applying this 10% to the average 1049 gallons claimed by the respondents gives 100 gallons for heating water. (Alternately the dollar amount can be translated into gallons of LP by using an average price of about $0.75 per gallon of LP, yielding approximately 115 gallons). The uncertainty of the result is as large as the result itself, however.

3. FARM ENERGY USE

The overall energy uses for farming were divided into the following categories in the survey: Electrical, LP, Motor Fuel, Alternate Energy, and Embedded Energy (in fertilizers, chemicals, and animal feeds).

3.1. Farm Electrical Energy Use

Question 14 requested checkmarks or zeroes to 12 matters:

> For which of the following [12] farm operations did you use any electricity during 1984? (Check as many as apply; write a "0" if you did not perform an operation or did not use electricity for it).

Almost all farmers responded to this question, even those unable or unwilling to give quantitative energy use answers. So few, however, wrote zeroes for operations where no checkmarks appeared that zeroes and blanks were not distinguished in coding. The categories of electric use and the response numbers and rates are given in Table D. The percentages represent the percent of all farmers that use electricity for a particular purpose. For example, 40.4 percent of farmers in West-Central Illinois use electricity to run crop drying equipment, while 24.3 percent use electricity as the source for heat in crop drying. Since many farmers use electricity for more than one purpose the total exceeds 100.0 percent.

----------TABLE D----------

Electricity for Farm Operations

Operation	Responses	% Response
Crop drying (mechanical equipment)	55	40.4%
Crop drying (heat)	33	24.3%
Ventilation for animal confinement	25	18.4%
Space heat for animal confinement	20	14.7%
Heat lamps for farrowing crates	41	30.1%
Grinders for animal feed	15	11.0%
Conveyors for animal feed	24	17.6%
Walk-in refrigerator	1	0.7%
Bulk milk tank (compressor)	1	0.7%
Automatic milker (compressor)	1	0.7%
Irrigation/water pumping	25	18.4%
Other	25	18.4%

To obtain a quantitative measure of the amount of electric energ used for each of these purposes, the total electric energy (KWH) use by each farmer should be correlated with the type of use. Two tool were available for this. First, each respondent was asked to sign release for the Coop to provide ITA with KWH sales figures. Second farmer-respondents were asked to indicate whether they had a separat meter for specific farm operations. Approximately 25 percent of th farmers have one or more separate meters for specific farm operations as shown below, (See Table 60).

Separate Electric Meters

Operation	Responses	%
Crop drying	17	12.5%
Animal confinement	9	6.6%
Irrigation/pumping	8	5.9%
Other	6	4.4%

A complete quantification of electrical energy use for far

operations was frustrated by incomplete data from separate meters. The cooperatives were able to supply separate meter data for only 16 of the 32 farmers who indicated separate meters, and gave data for eight more who had checked no part of the separate meter question (compare Tables 61 and 60). As a result the data that appear as Variables 65 and 70 in the codebook REUSFC1 do not fully reflect the electrical energy used for farming. Telephoned requests to Coops for missing information yielded as reasons that there must have been a mismatch between the account name attached to the separate meter and the name of the respondent or that some of the farming meters may have been supplied by a different utility or Coop.

A lower limit to electrical energy used for farm operations is the 4500-5000 KWH difference (Table B) between the average residential meter usage of farmers and non-farmers. In addition, an average of 5160 $\pm$ 1326 KWH appeared on second meters of 18% of the farmers (See Table 62).

The farm population energy intensivity index is 4750 $\pm$ 250 KWH on the residential meter plus 0.18 X (5160 $\pm$ 1326) KWH on the reported separate meters, for a total of 5700 $\pm$ 1800 KWH or 19 $\pm$ 6 mmBTU. The product of this farm use electric energy intensivity index and the number of farmers in the population should set a lower limit to the electrical energy used for farming. The actual amount is very probably higher, as discussed in Note 1 to Section 3.

An approach to estimating the electric heat energy used in crop drying is described in Section 3.2.1., below.

3.2. LP Gas Use for Farming

A little over half (53.8%) of the farmers in West-Central Illinoi use LP gas for some agricultural purpose. The largest use is for crc drying accounting for 83 percent of total LP farm use, followed by hea for animal confinement. Those that used LP used an average 2348 ± 37 gallons in 1984 (See Table E).

----------TABLE E----------

Average LP Used for Farm Operations

End Use		Amount	Responses	%	Energy Intensivity Index
Crop drying	*	2574 ± 447 gal	48 *	41.0%	98 ± 17 mmBTU
Heat for animal confinement	*	1025 ± 227 gal	19 *	16.2%	15 ± 3.4 mmBTU
Irrigation/pumping		-----	0 *	0%	0
Other farm operations	*	393 ± 98 gal	14 *	12.0%	4.4 ± 1.1 mmBTU
**Total	*	2348 ± 379 gal	63 *	53.8%	117 ± 19 mmBTU

* From Tables 63-70.

** Total as reported by respondents.

The average of the "total LP used for farm operations" is not th sum of the averages for each end use, since these averages were obtaine by considering only those farmers who had LP for each purpose. Th "energy intensivity index" on the other hand takes into account both th average use and the fraction of farmers making each use, and i

additive. For all farm LP uses the index is 117 ± 19 mmBTU.

3.2.1. Crop Drying Fuels and Practices

One of the largest energy demands in farming is the fuel required to dry corn. Three-quarters of the corn in West-Central Illinois is dried on the farm. One quarter is either not dried at all or dried at the elevator. Of the 74.6 percent dried on the farm, 32.8 percent was dried by LP heat only, 3.0 percent by electrical heat only, 36.3 percent with a combination of LP and electrical heat, and 2.5 percent was contracted out to another farmer for drying (See Table F).

Farmers with less acreage are the most likely not to dry their own corn, while those with more acreage use LP heat or a combination of LP and electrical heat.

Considering only the corn dried solely by LP and dividing total LP gallons used by the number of corn acres planted, yields an average of 10.6 ± 1.0 gallons of LP to dry an acre's yield of corn. Similarly the corn dried with a combination of LP and electric heat required an average of 8.3 ± 0.6 gallons of LP to dry an acre's yield of corn.

An estimate can be made of the ratio between LP and electricity for the 36.3 percent of the corn dried with a combination of both fuels by assuming the same yields per acre and average total heat requirements for drying LP-only corn and the LP + electrical heat corn. On the basis

of those assumptions we estimate that 61 ± 5 percent of the corn wa dried with LP, 11 ± 5 percent was dried with electricity, 2.5 percen was contracted out, and 25.4 percent was either not dried at all or sol to the elevator with penalty points (See Table G). A reasonabl estimate of the energy intensivity index for electric heat to dry cor is 11/61 of the e.i.i. for LP to dry corn in Table E, that is, 18 ± 1 mmBTU.

----------TABLE F----------

Corn Drying Information Supplied by 106 Farmers

Fuel Reported	Number (%)	Ave. Corn Acreage	Number with 100 Acre or Less
LP only	(a) 21 (19.8%)	(a) 290 ± 54	(b) 7 (33.3%)
LP + el.ht.	(c) 26 (24.5%)	(c) 259 ± 42	(d) 7 (26.9%)
El.ht.only	(e) 4 (3.8%)	(e) 137 ± 37	(f) 3 (75.0%)
Hired*	(g) 6 (5.7%)	(g) 77 ± 19	(h) 4 (66.7%)
Subtotal	57 (53.8%)		21 (35.6%)
None reported	(i) 49 (46.2%)	(i) 96 ± 13	(j) 33 (67.3%)
Total	106 (100.0%)	(k) 175 ± 18	54 (50.9%)

Fuel Reported	Gallons LP to Dry Corn	Acres of Corn	(%)	Gals. LP /acre corn
LP only	(l) 64610 ± 3638	(a) 6090 ± 242	(32.8%)	10.6 ± 1.0
LP + el.ht.	(m) 55854 ± 2496	(c) 6739 ± 212	(36.3%)	8.3 ± 0.6
El.ht.only		(e) 550 ± 65	(3.0%)	
Hired		(g) 464 ± 42	(2.5%)	
Subtotal		13843 ± 331	(74.6%)	
None reported		(i) 4724 ± 91	(25.4%)	
Total	120464 ± 4412	18567 ± 343	(100.0%)	

* In addition one farmer who dried 220 acres of corn with LP and one who dried 125 acres with LP el.ht. hired some crop drying done.

(a)-(m) Tables 71-83.

----------TABLE G----------

Sources of Corn Drying Energy

	Acreage	LP Acreage (%)	El.Ht.Acreage (%)
LP-only corn	6090 ± 242	6090 ± 242 (32.8%)	
LP+el.ht.corn	6739 ± 212	* 5256 ± 876 (28.3%)	* 1483 ± 809 (8.0%)
El.ht.only	550 ± 65		550 ± 65 (3.0%)
Subtotal	13379 ± 322	11346 ± 909 (61.1%)	2033 ± 844 (11.0%)
Hired	464 ± 42		
Not dried	4724 ± 91		
Total	18567 ± 343		

Note: The *'d numbers must be treated with perhaps even more skepticism than the large values of the propagated error suggests, since they depend on some risky assumptions.

The BTU value of the 10.6 gallons of LP to dry one acre is 1.
mmBTU per acre of corn (at 92,500 BTU per gallon LP). Assuming an equa
requirement of electric heat to dry an acre of corn, approximately 29
KWH/acre of corn are required (at 3420 BTU = 1 KWH). In addition t
electric heat to dry corn, considerable electric energy is required fo
related mechanical equipment: blowers, stirrers, conveyors, etc., on th
40.4 percent of the farms that report using such equipment. (A goo
estimate of the usage would require a more detailed survey as would an
estimate of the switching between fuels as relative prices change).

The ratio of electric heat to LP heat for corn drying is likely t
be sensitive to the relative costs of the fuels. Similarly the fractio
of corn not dried on the farm may fluctuate with the fuel cos
(including the operation of mechanical equipment) relative to the pric
discount for selling undried corn. Year to year comparisons would b
required to determine the price elasticity of electricity for cro
drying.

3.3. Motor Fuels for Farm Use

Two-thirds of the farmers reported using an average of 3166 $\pm$ 35
gallons of diesel fuel; 80% used an average of 1816 $\pm$ 180 gallons o
gasoline for farm operations (See Tables 84-85). In both cases th
largest use is for "field operations on your farm".

The results of computations of the energy value and energ
intensivity indices are shown in Table H, using 140,000 mmBTU per gallo

of diesel fuel and 125,000 mmBTU per gallon of gasoline.

----------TABLE H----------

Energy Contents of Motor Fuels for Farm Operations

	Diesel	Gasoline
Response %	66.7%	80.3%
Average amount used	3166 ± 353 gal	1816 ± 180 gal
Average energy (mmBTU)	443 ± 49 mmBTU	227 ± 22.5 mmBTU
Energy Intensivity Index	295 ± 33 mmBTU	182 ± 18.0 mmBTU

Allowing for a 5% understatement of usage to cover those who did not respond to the motor fuel question (See Note 2 to Section 3), the energy intensivity index for motor fuels is 500 ± 40 mmBTU.

3.4. Alternate Energy Use for Farming

No significant use is made by West-Central Illinois farmers of alternate energy sources. A small percentage (4.4%) use wood for heating air for farm operations (See Table 86-88).

3.5. Embedded Energy

A certain fraction of the energy used for farming is "embedded" in a product such as fertilizer, herbicide, or insecticide. These are largely derived from petrochemical feedstock, require additional energy to manufacture, and, for pesticides, may use petrochemical carrier solution. In addition, a number of livestock operations required the

importation of animal feeds (to replace or supplement crops grown on th same farm). If the entire animal feed needs of a livestock operatio were met internally, from the same farmer's grain production, the farm' balance sheet would show a smaller input, but also a smaller output o grain. Thus any detailed energy balance would require measurement o these energy inputs. A similar internal transaction within the far results from the use of any manure produced on the farm that offset fertilizer purchases.

3.5.1. Fertilizer

The survey asked respondents to give a figure for "lbs. of N" "lbs. of P205", and "lbs. of K20", with provision for "other fertilize products and amounts". Virtually every farmer with any crop acreag showed fertilizer use, and the majority were able to state their use i lbs.

The energy embedded in fertilizers is approximately 31.1 mmBTU/100 lbs Nitrogen, 5.56 mmBTU/1000 lbs P205, and 4.28 mmBTU/1000 lbs K20 (Se Note 3 to Section 3). The average amounts of fertilizers used in lb are given in Table I, together with the response rate and the energ intensivity indices.

----------TABLE I----------

Fertilizer Amounts and Energy Intensivity Indices

	Nitrogen	P205	K20
Response rate	* 85.3%	** 79.3%	*** 81.0%
Ave amount used	27553 ± 3359 lbs	19737 ± 3061 lbs	26129 ± 3928 lbs
Embedded energy	857 ± 1104 mmBTU	110 ± 17 mmBTU	112 ± 17 mmBTU
E.I.I.	731 ± 89 mmBTU	87 ± 13 mmBTU	91 ± 14 mmBTU

* Table 89
** Table 90
*** Table 91

Allowing for a 6% understatement (See Note 4), the overall energy intensivity index for all three types of fertilizer is 960 ± 100 mmBTU.

3.5.2. Pesticides

Over thirty different herbicide, insecticide and fungicide products were listed by respondents in a variety of different kinds of units (lbs., gallons, dollars, etc.). The reduction of these data into embedded energy was not feasible within the time and budget constraints of this study.

A very rough estimate of energy embedded in pesticides is possible if one assumes that the ratio of pesticide use to fertilizer use was the same in West-Central Illinois in 1984 as it was in all Illinois in 1974. According to "Energy and U.S. Agriculture: 1974 Data Base", Federal Energy Administration, September 1976 (FEA/D-76/459), pp.15 and 17, the fertilizer embedded energy for Illinois was 2.272 mmBTU/acre and the

pesticide embedded energy for Illinois in the same year was 0.1[illegible] mmBTU/acre (See Tables 92-93). Applying this ratio of 6.8% to the 19[illegible] data we obtain a very speculative 65 mmBTU as the energy intensivi[illegible] index for pesticide use.

3.5.3. Purchased Livestock Feeds

Nearly all livestock farmers are also grain farmers and presumabl[illegible] grow much of their animal feed requirements. However, 30 farme[illegible] reported purchasing corn for animal feed, 17 purchased soybean meal, a[illegible] 61 bought feed supplement. Based on the majority in each case w[illegible] specified these feeds in compatible units, the total importation [illegible] agricultural products is tabulated below, along with the percentage [illegible] all farmers who made such purchases.

----------TABLE J----------

Feed Purchases

	% of farmers	Average Amount
Corn	22.0%	5167 ± 1109 bu
Soybean Meal	12.5%	70300 ± 15643 lbs
Feed Supplement	45.0%	62753 ± 16010 lbs

From DATA, pp.346-353.

Note: In addition 18 farmers (13%) purchased "other livestock feed".

Since it was not feasible to obtain a direct measurement of t[illegible] output of the farming operations, little would be gained by translati[illegible]

these data into energy terms. It is clear that the decision whether to buy or grow the majority of livestock feed is principally an economic one, and that any factor that differentially raises the cost of farming in West-Central Illinois gives an incentive to import more.

3.5.4. Manure Production and Use

One other internal transaction that converts what is potentially a farm energy output into an input reducing the need for external inputs is the use of manure from a livestock operation. As with livestock feed, we cannot make a detailed balance, since we have no production figures. It is worth noting however that over 90% of the solid manure and over 95% of the liquid manure produced was used on the farm. Over 28 percent of the farmers reported solid manure and 6.7 percent, liquid manure. The average amount of solid manure was 324 $\pm$ 131 tons produced and 297 $\pm$ 132 tons used (where the extraordinarily large amount reported by one farmer has been excluded; See Tables 94-95). The average amount of liquid manure is 148,000 $\pm$ 42,776 gallons produced and 143,000 $\pm$ 38,560 gallons used (See Tables 96-97).

3.6. Summary of Farm Energy Use

Farm energy intensivity indices, in order of importance in the West-Central Illinois farm population sampled in this survey are summarized in Table K.

----------TABLE K----------

Summary of Farm Energy Uses Per Farmer

Fertilizer (embedded energy)	960 ± 100	mmBTU
Motor Fuel for farm operations	500 ± 40	mmBTU
LP gas (83% for crop drying)	117 ± 19	mmBTU
Pesticides (estimated at 7% of fertilizer)	est. 65	mmBTU
Electrical use generally - lower limit	5700 KWH or 19 ± 6	mmBTU
Electrical heat for crop drying	est. 18 ± 13	mmBTU
Alternate energy	negligible	

Notes to Section 3

Note 1

Three of the four rural electric cooperatives provided monthly usage data. A number of farmers' residential accounts showed a decided peak for November use, which is constant with crop drying use. A small number of the separate meter accounts showed a similar seasonal trend. The total of the crop drying operations recognizable by this means is far less than the 55 who use electricity for "crop drying (mechanical equipment)" and even than the 33 who use electricity for "crop drying (heat)". Together with the fact that no data on separate meters were supplied by the cooperatives on fully half the respondents who said they had separate meters, this leads to the conclusion that a potentially large but indeterminate fraction of electrical energy for farm use has escaped detection by this survey.

Note 2

Of the farmers who were generally responsive to energy questions and who had 100 acres or more planted in 1984 only 6, i.e., 5%, failed to state an amount of motor fuel used. Since it is likely that a farmer with 100 acres planted would be using an appreciable amount of motor fuel, 5 percent is a reasonable estimate of size of the understatement.

Note 3

We have inferred the embedded energy in nitrogen, P205 and K20 fertilizers from the numbers reported in "Energy and U.S. Agriculture: 1974 Data Base", U.S. Department of Agriculture, September 1976, FEA/D-76/459, p.14 (Table 98). If n, p, and k represent the embedded energy in mmBTU for nitrogen, P205, and K20, respectively, then the data

on the first three lines of Table 98 yield the equations:

$$6627499\ n \pm 3587970\ p \pm 3576778\ k = 241373000$$
$$221233\ n \pm 847917\ p \pm 1041127\ k = 16051000$$
$$2021972\ n \pm 1230181\ p \pm 561507\ k = 72126000$$

The solutions to these equations yield
n=31.1 mmBTU/1000 lbs, p=5.56 mmBTU/1000 lbs, k=4.28 mmBTU/1000 lbs

The Energy and U.S. Agriculture survey includes in what it call "invested energy" the energy required to transport the product to th farm gate. Except for minor variations in relative transportation cost and manufacturing methods, there should be no significant change of th embedded energy since these data were obtained in 1974.

Note 4

The responses of 8 farmers to the fertilizer question indicate some nitrogen, phosphate or potash fertilizers that could not readily b expressed and recorded in lbs. This constitutes 6 percent of know fertilizer users whose use is not included in Table I. Accordingly th sum of the energy intensivity indices for Nitrogen, phosphate, an potash has been increased by 6%.

4. CHANGES IN ENERGY USE PATTERNS

4.1. Changes in General Energy Use Patterns

In rural West-Central Illinois in the past 10 years 44 percent of all households have made some kind of change in heating practices, 26 percent have made some kind of change in cooling practices, 15 percent have made some kind of change in appliance usage and 32 percent have made changes by weatherizing or insulating their homes. The rate of making changes is increasing.

Nearly all fuel changes in which electricity was the newly adopted fuel occurred prior to 1980. Nearly all fuel changes which included dropping electricity have occurred since 1980.

There was almost no significant difference between farm and non-farm households in either the likelihood to have changed energy use patterns, or in the timing of those changes.

Households have taken many different kinds of actions as they have changed their energy use patterns in the past 10 years. The most common changes in heating practices were shifting to wood, reducing usage by lowering the thermostat, and replacing the furnace. Changes in cooling practices generally took the forms of reduced usage, installing fans and switching from window units to central air conditioning. Insulating, caulking, weatherstripping and changing appliances and fuels have all been common actions. The description of the change, within each of the five categories of Question 7 was left to the respondents. Commonly

occurring descriptions led to the coding as shown in Tables 99-103.

The years in which these changes were made have been aggregated a shown in Tables 104-113. The first of each pair of tables shows th responses of all, and the second of farmers only. The pace of makin changes over the past ten years has increased dramatically as shown i Table L.

----------TABLE L----------

Number of Households Reporting Changes in Energy Use Practices by Year, by Type of Change.

Kind of Change	Time of Change					
	Before 75	75/76	77/78	79/80	81/82	83/84
Heating Practices	8	10	23	31	35	40
Cooling Practices	3	4	13	14	14	30
Appliance Usage	1	2	5	2	15	17
Weatherization etc.,	4	5	6	20	20	37
Other Changes	2	6	4	12	15	14
Total Changes	18	27	51	79	99	138

Five times as many changes in energy use practices were reported h have been made in the two-year period 1983/84 as were made eight yea earlier in the period 1975/76.

4.2. Changes in Primary Heating Fuels

The trend of change in primary heating fuel in rural West-Centra Illinois is away from oil and gas and toward wood. In nearly three every five changes that have been made the new fuel is wood. The shi

away from oil peaked in 1979/80 while the shifting away from LP continues to show a small but steady increase.

One in every five households (19.8 percent) have changed their primary heating fuel in recent years (See Tables 114-115). Of those who have changed 58.6 percent have gone to wood, 21.4 percent have gone to natural gas, and 11.4 percent have gone to LP. Farmers made an even more pronounced shift to wood than non-farmers; 16 percent of all farmers and 9 percent of all non-farmers stated that they had switched to wood as a primary heating fuel.

The abandoned fuels have typically been LP (39.1 percent); oil (37.7 percent); and electricity (10.1 percent) (See Tables 116-117). These numbers are put more in perspective when they are related to the original market share of the fuel. Over 10 years, 42 percent of oil home heating customers have abandoned oil; 15 percent of electric home heating customers have switched away from electricity; and 4 percent of the LP/natural gas customers have switched away from LP or natural gas.

The desirability of a new primary heating fuel depends to some extent on the household's old fuel. Although the overwhelming choice of new fuel is wood (58.6 percent of all changes) the percentage varies by the type of old fuel. Of the households that abandoned oil only 38 percent went to wood (50 percent went to gas) while of those who left LP and natural gas, 75 percent went to wood (See Table 118). No households shifted to oil as a new fuel. Almost all the households that adopted electricity as a new home heating fuel did so prior to 1980, while almost all the households that abandoned electricity did so after 1980

(See Tables 119-120). The numbers are small and may not be significant but the small number of households that shifted to electricity tended t have abandoned oil, while those that abandoned electricity tended to g to wood as the new source of home heating. The pace of making change has been twice as great since 1979 as before (See Table 121).

4.3. Changes in Water Heating Fuels

Where one in every five households have changed their primar heating fuel in the past 10 years, only one in every 12 households (8. percent) have changed their fuel for heating water. The direction c the change has been overwhelmingly (seven out of every 10) away fr electricity and toward (three of every four) LP and natural gas (Se Tables 122-123).

The rate of change is also increasing dramatically. Half th changes have taken place in the last two-and-a-half years (See Tab 124). A little more than 10 percent of the electric hot water heatir market has already switched away from electricity. Almost all (9 percent) of those have gone to LP or natural gas (See Table 125). I electric rates continue to increase the switch away from electricity a a water heating fuel could accelerate rapidly as 43 percent of th electric water heating households already use LP or natural gas for hor heating (See Table 8).

4.4. Changes in Cooling

A household has fewer alternatives for cooling the home in summer than heating the home in winter. One either cools or one doesn't. One can cool less space or increase the temperature one is willing to live with. In the latter instance one can substitute a fan for an air conditioner, or use the air conditioner only on the warmest days. Electricity is practically the only source of energy for cooling, however, and any change that results in less cooling reduces the usage of electricity.

Approximately one in every five households in rural West-Central Illinois who have air conditioning report they have reduced usage, either by raising the thermostat, cooling less often, or switching to fans (See Table 126). Thirteen percent of those who have air conditioning have either purchased new units or changed from window units to central air conditioning. The data do not allow us to determine if that change was made to increase cooling or improve efficiency or some combination of both.

4.5. Characteristics of the Households that have Changed Fuels

The data indicate that the most significant variables affecting the decision to change either primary heating fuel or the fuel for heating water are (a) the number of people in the household, and (b) the average age of the adults in the household. Families with children, and adults

aged 25 to 45 are the most likely households to have changed fuels i the past 10 years. The age, size, and ownership of the home, and th presence or absence of insulation, all seem to have had no impact on th decision to change fuels.

One and two-member households make up 52.4 percent of the total i rural West-Central Illinois, but accounted for only 27.1 percent of th households that changed fuels (See Table 127). Three, four ar five-member households, on the other hand, make up 43.4 percent of th total, but accounted for 68.3 percent of the households that change fuels.

Similarly, households with adults aged 25 to 45 comprise 44. percent of the total, but accounted for 67.3 percent of the household that changed fuels. As the age of adults in the household increase past 45 the likelihood of the household having changed fuels decrease steadily (See Table 128).

In rural West-Central Illinois there is little difference i characteristics between farm and non-farm households. There is sor tendency for farmers to have larger families, older homes and large homes (See Tables 129-134). The proportion that own their own home i approximately the same as is their choice of fuel for home heat althou there is a tendency for farm households to use relatively le electricity and more wood for heating, and a larger percentage of tho who have changed their primary heating fuel have gone to wood (S Tables 135-138).

Farm households tend to use more electricity and less LP for heating water than do their non-farm neighbors, but when they change their fuel for heating water the move away from electricity and toward LP is more pronounced (See Tables 139-144).

In total, farm households are more likely in the last 10 years to have changed either their primary heating fuel or their fuel for heating water than non-farm households (See Tables 145-148).

5. THE METHODOLOGY

5.1. Background and Description

After considerable discussion with DENR staff as well as th Director and the professional staff of the Association of Illino Electric Cooperatives, it was decided that the analysis methodolo should be a process which would involve as much internal feed-back a possible in the development of each phase of the effort.

Phase one was the development of the study population. It wa decided that the sample would be drawn from the customer population o four Electric Cooperatives (Adams Electrical Co-Operative, Illino Rural Electric Co., McDonough Power Cooperative, and Western Illino Electrical Coop). Institutions (such as city, state or federa offices), non-agricultural businesses, churches, golf courses, etc totaling 21 or 3% of the original sample were excluded. Care was tak to use member lists culled of duplicate meters to the same customer Careful effort was expended to develop good working relations with a parties involved.

Phase two was the development of the research tools in severa incremental stages. First it was necessary to determine custom grouping, use data available from the cooperative, billing informati available and a range of other characteristics. Secondly, a serio attempt was made to determine the best way to get information from th population. Interviews were conducted with a small number of select customers to obtain information about preference, concerns and custo

so that the survey instrument could be designed to obtain as much information as possible. A third stage involved the construction of a draft instrument and mailing it to a random sample of 20. A fourth stage involving many meetings with DENR staff, was to refine the draft questionnaire in order to insure that its length and complexity were not overwhelming and that questions could be avoided which might cause response to the survey by farmers to be too small.

Phase three involved data collection. Several techniques were used to assure the best possible response to the survey. Repeat mailings were sent, an extensive follow up phone survey was undertaken, and an inducement in the form of a cash award based on promptness of response was offered.

Phase four was the recording, interpretation and analysis of the data. While the questionnaires were being returned, codebooks were designed and assembled. Data were aggregated in different patterns in order to gain insight into the changing energy patterns of the survey sample. Raw data were converted into energy terms.

These four phases are explained in greater detail in the remainder of this section. Together they represent what we feel is a powerful and effective process for probing the energy use patterns of a region.

5.2. Choice and Sampling of the Population

This report is a study of the energy sources and end-uses in ten

West-Central Illinois counties and parts of three others. The larges part of the region lies between the Illinois and Mississippi Rivers.

The area was chosen because it is primarily rural and agricultural the economy, population and land configuration is relatively homogenous and access to a representative sample of the rural agricultura population was feasible.

The four rural electrical cooperatives that serve the region were very helpful. The sample drawn to represent the "Rural/Agricultural population of the area was randomly selected from the cooperatives membership lists.

The question of who was a Rural Electric "member" turned out to b a matter that required careful definition. The Cooperatives regard eac "account" a member. The Statistical Information published by th Association of Illinois Electric Cooperatives (AIEC) lists the fo cooperatives as having the number of "members" shown in the first colu of Table M.

----------TABLE M----------

Members of Four Rural Electric Cooperatives

Cooperative	Number of Members (1)	Net Member List (2)
Adams	7174	5683
I.R.E.C.	9741	7843
McDonough	4636	3260
Western	3366	2680
Total	24917	19466

(1) From "1984 Directory of the Electric Cooperatives of Illinois", AIEC, Springfield, IL 62704.

(2) The July 1985 Newsletter mailing lists net of recipients of complimentary copies. (Information provided by AIEC.)

Column 2 of Table M shows the net membership, eliminating duplication. The fluctuation in active accounts from year to year is 100 or so. The discrepancy between the columns is due not to the passage of time, but to the fact that numerous members, especially farmers, have multiple accounts associated with different meters, perhaps at different locations, or for different classes of service. Since the present study seeks to estimate each respondent's total energy use, residential and agricultural, each participant was asked about all his or her electrical meters and accounts as well as the other fuels and energy forms. Although it would have been unlikely that more than one account of any member would have been randomly selected for the survey, it is clear that the owner of three accounts would be three times more likely to be selected than a one-account member if the sample were selected from the list of accounts. It was necessary to take special pains to collapse the list of accounts to the "net member list".

A precise definition of the experimental population from which t sample was drawn would have to include the following: no towns f population over about 500 are served by these Coops; somewhat under of the rural population in the region has "direct drops" fr investor owned utility transmission lines and is not served by the rur electric cooperative; and 3% of the gross sample (21 names) which we neither residential nor agricultural energy users - two churches, t oil wells, railway signal lights, golf, country and motor cycle club etc., to a total of 21, one of them after receipt of the usage reco from the Coop.

In summary, the random sample of 589 members of the fo Cooperatives, selected in numerical proportion to their net memb lists, accurately reflects the whole population of the region except f a small number of cities and towns, within a 3% error due to t restriction to "residential or agricultural".

5.3. The Questionnaire

The draft versions of the Questionnaire (see Appendix), careful designed to allow a detailed quantification, had a very poor te response rate among farmers and only a fair rate among non-farmers. busy farmer will simply not take the time to fill out a ve complicated, detailed, quantitative survey - the more so because in h experience facts so gathered have been used to his disadvantage. The is a trade-off in survey work between complexity and response.

perfectly detailed inventory can be designed, and receive zero responses. Or a perfectly innocuous (and senseless) instrument could be designed for a very high (but useless) response. The Questionnaire in its final form (see Appendix) is a reasonable compromise between substance (probing for hard data) and accessibility (inviting the respondent into the game of answering).

Respondents evidently found it easy to get into the task of answering the survey as evidenced by response rates around 98% for the first six questions. Respondents were remarkably forthcoming and revelatory in answering open-ended questions, such as Question 7 on their changes in energy use practices, in a manner that permitted consistent and quantifiable coding. (The strategy on the narrative answers was to collect them into a separate appendix for each item on the Questionnaire and to inspect the appendices for recurring categories of answers). The response rate was substantially less on such questions as 11.(a): amount (KWH) of electricity used in 1984 (35% response rate among the Questionaire respondents) or the amount paid in 1984 for electricity (46%). On that particular question the non-response is not so serious since 88% of all respondents signed a release for their Coops to provide monthly KWH usage data.

The rationale for asking both amount and $ paid was our belief that many users might know the cost but not the amount of energy. This was the case for electricity (35% vs 46%), and natural gas (5.4% vs 9.3%), less so for LP (41.2% vs 45.5%) and the other way around for oil (14.4% vs 13.6%). A computation of the unit cost of each fuel serves both to identify possible data entry mistakes and to test the reasonableness of

respondents' recollection.

A more serious lack of quantitative information than Questi 11.(a) is the level of nonresponses to Questions 11.(c) (LP) and 11.(c (NG). Questions 8 and 9, on space and hot water heating fuels, did nc distinguish between LP and NG, in the expectation that Question 11 woul be completed or that 0's would be filled in where none of a fuel wa used or purchased. Only 203 users of 251 gas for home or water heati provided information about amount or cost of LP or natural gas. Ou solution to this problem has been presented in Section 2.5., above.

Taken as a whole, the Residential portion of the Questionnai provides a large amount of information, from an adequate fraction of th sample, and allows significant extrapolation to the population.

The Farm portion of the Questionnaire provides a convinci qualitative description of the relative weight of livestock and cro (in part through the open-ended, unnumbered "How would you describe yo farming operation?" question on page 3 of the Questionnaire), and of th distribution of acreage devoted to various crops. Significa quantitative results are available concerning the amount of LP use fo farm operations and crop drying practices; amount of motor fuel use; a the amount of embedded energy in fertilizer. The amount of embedd energy in pesticides could be determined only with great difficul because of the great variety of pesticides reported.

Farm households who responded numbered 136 or over 38% of th Questionnaire respondents. However, 19 of these 136 gave such casu

attention to the farm portion of the Questionnaire that they should be classified as non-responsive to any quantitative energy use questions. Their Questionnaires are considered in the Residential part and in the qualitative description of the west-central Illinois farm economy, but are not be counted in assessing the energy used in farming. In classifying farmer status we have found it necessary to create five categories, tabulated in Variable 23 of REUSRC1 and repeated in Variable 2 of REUSFC1. They are: 0 = "residential only", that is, persons not responding to any farm questions, except those whose Coop records show no purchases until late 1984 or 1985, who are classified as 4 = "res - new in '85"; 1 = those farmers who are not in category 2 or 3; 2 = farmers who were non-responsive on the quantitative energy questions; 3 = farmers whose electric Coop records lacked a residential meter (they apparently live in towns served by investor owned utilities).

Farmers bear a double burden in completing the farm questions. First, the full questionnaire is more than twice as burdensome for a farmer to complete than for a non-farmer. This of course increases the likelihood that the survey will be discarded by farmers. Second, numerous farmers have explained, during the instrument testing phase of this project, that farmers are subjected to a barrage of crop surveys and are not infrequently financially harmed by the publication of the results. For these reasons we can anticipate that the proportion of farmers in the target population is greater than the proportion among the Questionnaire respondents. (A minor additional distortion may have been introduced by tacitly encouraging a farmer to fill out the residential portion only and to pose as a non-farmer, either to avoid the task of completing Part II or to qualify for the cash award without

full performance. But there was a very low level of non-response Question 13 and a high congruence between the responses to it and oth indications whether the respondent was indeed a farmer. False respon is far less consistent with the impression left by the complet Questionnaires than is systematic non-response).

A surprisingly high response was obtained to crop-acreage questio and other potentially sensitive matters such as age and work statu Any effort to obtain direct answers regarding income or total fa produce was abandoned, however, in the final Questionnaire, as a resu of explicit comments by non-respondents to the draft survey, that the objections to such questions led them to discard this survey.

Among the unsolved problems in the survey, these stand out:

(1) A number of respondents are "retired" from farming. (There was n "retired" option in the column headed "FARMING" in Question 13). By the standards of the Questionnaire, they are classed as non-farmers. Nevertheless, some went on, both in real life, to raise some hogs or crops, and in the survey, to answer some farmi questions.

(2) Despite best efforts - see for example the parenthetical instruction at Q.30 - to clarify how shared expenses should be handled, the Questionnaire does not address the large variety of ownership/partnership/lease arrangements that are prevalent. Mor than a few respondents were retired landowners who lease or rent out their land - in some cases for crop shares; some of these seemed not to know how much, if any, energy inputs they were personally responsible for. It is hard, without writing instructions to rival those of the IRS, to clarify all eventualities as to ownership patterns. The theory of the sampli technique was that it was as likely to catch an owning as a worki partner, a lessor as a lessee, and that the sample aggregate woul be representative.

(3) There was a difficult trade-off between reserving the imposing-looking Questions 8 and 11 for page 2 (to avoid scaring off responses) and the placement of Question 7. Had we been able to place Question 7 after Questions 8, 9, and 10, we might have better communicated its intent: to distinguish changes in practic

(e.g., closing off rooms, turning down the thermostat, etc.) from changes in fuels. As it was, quite a few of the responses to Question 7 described fuel changes. Possibly Question 12 could have been placed on the front page. Very few respondents refused to answer that question.

(4) The effort to identify non-use of some forms of energy or specific end uses by requesting the entry of zeroes proved fruitless. A preliminary yes/no question about every type of energy use could have better distinguished non-respondents from non-users.

One final issue in regard to the survey protocol needs to be brought to light. This was not an anonymous survey. In order to obtain accurate monthly electric use data (important for a number of computational and verificational reasons) a choice had to be made between two alternatives: each response could be sent to the respondent's Coop, for attaching electric use data, or each response could be sent to ITA with a signed release. The former would have exposed the respondent's survey to a neighbor, the Coop employee; the latter, to ITA, an outsider (but one who would not recognize the respondent on the street). With the advice of the Coops, the latter path was chosen. The cover letter assured not only confidentiality of the response but that "neither your electrical co-op nor any state or federal agency will see your completed survey".

5.3.1. Response Rate

The overall response was 353 returns out of 589 Questionnaires mailed out to Coop members, or 60%. (The rate is 61.6% if one uses a net figure of 573, deducting 11 persons who are deceased and 4 who have moved away according to information acquired during the telephone prompt as well as one respondent whose quasi-industrial use was incompatible

with the farming uses comtemplated in the questions). This is a remarkably good response to a mailed Questionnaire of such length and complexity - 2 1/2 pages for all respondents and 6 for farmers. Several factors contributed to this rate.

Three mailings were scheduled, at 12 day intervals (although the last mailing was abandoned because it appeared to promise no improvement commensurate with the time, effort and expense). A week prior to the first mailing, a letter was sent out on the letterhead of the pertinent electrical cooperative, and signed by its manager, announcing the survey and recommending cooperation (see Appendix).

The Questionnaire itself was accompanied by a stamped self-addressed envelope and by a cover letter (see Appendix) which asked the recipient to use his or her unique ability to help DENR acquire the "good facts" needed to find good "answers to rising energy costs - and maybe win $250."

The strategy of the cash award was directed both to assuring compliance with the request for a release to allow the Coops to provide ITA with electric usage data, and to assure a large as well as a prompt response to the survey. Because of the chance to win a cash award, ITA believes, respondents may have found it easier to provide their names and their signatures to the release. And the very fact of the award, and that it was a "contest" requiring an affirmative act from the participant, the guessing of a number, and not a mere automatic drawing, may have added an element of playfulness to the otherwise onerous task of filling out a Questionnaire.

The most significant feature of the incentive was its structure, designed to emphasize promptness: the size of the award would be at full value ($250) only if the response was postmarked before a certain date (chosen to precede the second mailing by a day or two), then drop to $150 until just before the planned third mailing, and finally to $100 for a final week. The purpose was to apply gentle pressure for promptness, while leaving intact some cash incentive for the second and third mailings. (See Appendix for the second cover letter.) Finally, speed was further encouraged by offering to break ties on the basis of priority of postmark. The results were dramatic: 327 respondents, over 92%, chose a number. Of these, 198 (61%) responded with a postmark qualifying for the full award, and a cumulative 311 (95%) had responded within the period before the award dropped to $100. Table N shows the numbers postmarked on each date, of all returns, and of the returns with number guesses. It demonstrates the rush of responses at the very start, the Sunday postmarks early in the period, and a mini-peak on the last day before the value of the prize changed.

TABLE N

Postmark and Incentive Awards

Month of Postmark	Day	Total Sent	Cumulative Total	Number w/Guess	Cumulative Number	Incentive
July	26	02	002	02	002	
	27	46	048	45	047	
(Sunday)	28	07	055	07	054	
	29	49	104	48	102	
	30	26	130	25	127	
	31	12	142	12	139	
August	01	16	158	15	154	
	02	17	175	17	171	
	03	09	184	08	179	
(Sunday)	04	01	185	01	180	
	05	18	203	18	198	$250
	06	08	211	08	206	$150
	07	11	222	11	217	
	08	14	236	12	229	
	09	27	263	23	252	
	10	13	276	13	265	
(Sunday)	11	01	277	00	265	
	12	21	298	19	284	
	13	12	310	10	294	
	14	08	318	07	301	
	15	07	325	06	307	
	16	05	330	04	311	$150
	17	03	333	03	314	$100
(Sunday)	--					
	19	02	335	02	316	
	20	02	337	00	316	
	21					
	22	02	339	02	318	
	23	03	342	02	320	
	24	03	345	02	322	
(Sunday)	--					
	26	05	350	04	326	$100
	27	02	352	01	327	none
	28	01	353			
	31	01	354			

Just as the returns by many respondents may have been called forth by the cash award, and the structured nature of the lottery may have been responsible for the early surge of returns, the 151 returns that came in after August 6 may have been prompted largely by the second mailing and, more especially, by a telephone prompt. For a week beginning on the evening of August 5th (when the opportunity for an early postmark was passed, and on the eve of the second mailing) those non-respondents who could be reached were called by phone. The questions posed are given in the Appendix; the only substantive one was, "Also, we would like to know if you or your spouse spend any of your time in farming." 305 calls were completed; 130 of the persons reached by telephone had either just mailed their responses (19) or did so subsequently to the call (111 "successful prompts"); 14 of the calls yielded the information that the addressee had died or moved away (one additional death was noted through the return of the envelope by the post office with a notation "deceased"); the balance were unsuccessful prompts, 161 of them, which did not yield a return. It is, of course, impossible to attribute the post-August 5 responses to any one cause, such as the phone prompt, the second mailing, or the incentive. Clearly all three were helpful.

The phone prompts had two purposes: one to enhance the response rate; the other to learn if the non-respondents were farmers. In a pretest with 20 members of the addresses originally furnished (randomly) by the Coops, farmers gave no response at all until after a phone call. It was important to learn whether the ratio of farmers in the population would be accurately reflected in the sample.

The percentage of the survey respondents who claimed farming as t full-time or part-time occupation of either spouse is 38%. Among a people called, the response to the more inclusive oral question ("Do y or your spouse spend any of your time in farming?") was 52%. If we we to make the assumption that the oral question was no more likely evoke the answer "yes, farming" than the Questionnaire, and the furth assumption that all the people who could not be reached were similar other non-respondents, then a reasonable upper limit to the fraction farmers in the population would is 45%.

5.4. Demographics

A number of demographic conclusions can be drawn with gre confidence. The overwhelming majority (over 80%) own their homes, ov half of which were built before 1940 (and about 80% of which have eith attic or wall insulation or both). The average household size is 2. for the entire sample. For farmers only, the average is 3.03. Tabl 149-152 show the distribution of household size.

The median age is 36.2 years (as compared to the median age of a covered by the 1980 U.S. census of 29.9 years), as determined from Tab 0. Although a part of this age discrepancy may disappear with a mo current census, the data indicate a population substantially older th the country as a whole. The fraction of members of the respondent households who are over 65 is 15.6%. The comparative figure for t U.S. in 1980 was 11.3%. Subject to modification by later cens figures, the sample contains 1.38 times the "expected" number of peop

over 65.

----------TABLE O----------

Number in Household by Age Range

Age	1	2	3	4	5	6	Total	Percent	Cumulative Percent
Under 6	44	17	1				81	8.6%	8.6%
6-17	40	37	11	1	2	1	167	17.7%	26.2%
18-24	43	23					89	9.4%	35.6%
25-34	45	39					123	13.0%	48.6%
35-44	41	37					115	12.2%	60.8%
45-54	40	33					106	11.2%	72.0%
55-64	43	37					117	12.4%	84.4%
65-74	37	33					103	10.9%	95.2%
Over 75	23	11					45	4.8%	100.0%

							946		

(From DATA, pp.3-11).

5.4.1. Agricultural Demographics

Of the total respondents, 136 (or 38.5%) identified themselves i some significant way as farmers. They either identified themselves a full or part-time farmers, planted crops in 1984, raised livestock, o reported that they are retired and rent out their crop land.

Of the 136 farm households, 41.4% reported farming is the on occupation; 13.5% reported the husband is a full-time farmer and th wife has a non-farm job; 33.1% reported that no member of the household is a full-time farmer; and 12.0% are retired part-time farmers (Se Table 153.

Among all farmers 73% include livestock in addition to crops (Se Table 154). Eighty percent of the full-time farmers also raisi livestock, 63% of the part-time farmers raised livestock (See Tabe 155).

Full-time farmers in 1984 planted an average of 384 + 39 acres (Se Tables 156-157). Part-time and retired farmers planted an average 194+ 40 acres (See Table 158). The part-time farmers break into two distinct groups, those with substantial acreage, and those with few acres (Tabe 159). Table P gives a summary of the average total acreage planted y full-time or part-time status.

----------TABLE P----------

Crop Acreage Planted in 1984 by Full-Time or Part-Time Status

	Number	Average Acreage
Full-time farm households	55	373 ± 43
Full-time farmer plus non-farm job	18	414 ± 90
Part-time farming plus non-farm job/jobs	44	177 ± 40
Retired farm households	16	* 248 ± 110
Total	118	310 ± 30

Missing cases = 15
Response percent = 88.7 percent

* 146 ± 45 average acreage when one largest farm is dropped
84 ± 17 average acreage when three largest farms dropped.
See Tables 160-167.

5.5. Analysis

The first task in the data anaylsis was to create a useful presentation of the answers to the Questionnaire. Section 5.5.1. explains how this presentation is to be understood. The ultimate purpose of the study was to measure the relative importance of each energy source and each energy end use in the rural/agricultural sector of West-Central Illinois. Section 5.5.2.-5.5.4., describe some of the methods used in moving from a bare presentation of results to an interpretation in energy terms.

5.5.1. Presentation of Results

Each member of the randomly selected sample was assigned a number,

which was written on the Questionnaire sent to that member. The same number identifies the responses of that person and appears as Variable #1 ("respondent number") in each data file. The respondent numbers implicitly identify the rural electric cooperative of which the respondent is a member. They were assigned as follows:

----------TABLE Q----------

Respondent Numbers and Rural Electric Coop Membership

McDonough	1 - 98
I.R.E.C.	101 - 330; 601-602
Adams	331 - 507
W.I.E.C.	511 - 593

The data entry and analysis was done on a micro computer using te Statistical Analysis Package ("StatPac"), Copyright David S. Walonic, 1981, 1982, 1983, 1984, 1985. This required the creation of thre codebooks: REUSRC1, which governs data file DEUSRC2 containig demographic information and residential energy use; and REUSFC1 ad REUSFC2, governing data files DEUSFC1 and DEUSFC2, which contan primarily farm energy data and are restricted to the farmer respondent.

The codebooks contain variables of several types:

(1) coded answers to questions in the survey (in which the firs part always identifies the Question #), which may be:

(a) numerical data, such as the amount of natural gas in therms or

(b) a numerical label corresponding to the choice of response t one of several options, such as which type of home heating fuel ad system, or

(c) a numerical label supplied after an initial screening of answers to open-ended questions, as discussed in Section 4.1., relative to Question 7 on "description of change";

(2) coded judgment of the coder (for example, Variable #22 of REUSRC1 identifies whether a respondent has checked any answer to Question 13 in the column marked FARMING as well as whether the respondent has answered any questions about farming (Q.14-30);

(3) variables obtained by computation from data supplied by respondents - e.g., Variable #62 of REUSFC1, the total reported acreage planted;

(4) the total electric energy supplied by the cooperatives after releases had been obtained from the respondents.

The bulk of the analysis was to produce a frequency distribution of every variable as well as StatPac produced descriptive statistics and histograms for the quantitative data. A full file of these analyses is available as an addendum to this report, referred to as DATA. Pages 1-140 of DATA are a file of the responses of all 353 respondents to the demographic and residential questions; pages 141-277 are the responses of 136 farmers only to the same questions, and permit an easy comparison between farmers and the entire sample; pages 278-456 are the responses - frequency distribution and, where appropriate, descriptive statistics - of 136 farmers to the farm questions. Finally, DATA contains a list of the unclassifiable answers offered by respondents to selected open-ended and "other (specify:_____)" questions, on pp.457-470.

A number of frequency distribution or descriptive statistics analyses were made by further selecting subsets of respondents. For example, Table 11 shows the average electrical usage of those

non-farmers only who use no electricity for primary or secondary hor heat, or for water heating or for air conditioning. In additio cross-tabulation charts were made, such as Table 8, to displa relationships. (In case of Table 8, between hot water fuel and prima heating fuel). The interpretation of Table 8 is characteristic of a such cross-tabulation. The first number in each cell is a number responses. There are, for example, 28 respondents whose primary heati fuel is wood and who use LP or NG to heat water. The numbers below, any, are percentages. In this case, 45.2 of the respondents who hea with wood use gas for hot water, while 51.6 percent use electricity f hot water. The first row of percentages in this table add up to 100% each row, and are "row percentages". The 17.4% represents a colu percentage - i.e., 17.4% of respondents who heat water with gas use wo as their primary home heating fuel. The column percentages in ea column total 100%.

The most important of the results are referenced in the runni text of this Report and included among the Tables. The DATA volumes a complete with respect to the variables in codebooks REUSRC1, REUSFC1 a REUSFC2, and are offered as an addendum to DENR and to the four rur electric cooperatives and their Association.

5.5.2. Energy Intensivity Index

For ease of comparing the relative importance of the various ener end uses and sources on a per capita basis we created an "ener intensivity index" ("E.I.I."). The E.I.I. is expressed in energy uni

(mmBTU or alternatively KWH). The values of E.I.I. are additive in the sense that the per capita use of electricity, for example, is the sum of the E.I.I. values for each electrical end use. Per capita use is not to be confused with average use, however. If, for example, 11 percent of respondents use electric home heating and if the average home heating requirement is 10,000 KWH or 34.2 mmBTU (and the remaining 89 percent use no electric space heating), then the per capita use in the sample, the energy intensivity index, is 0.11 X 10,000 KWH or 0.11 X 34.2 mmBTU (1100 KWH or 3.8 mmBTU).

In the case of results for farming, the energy intensivity index is a farmer per capita energy use figure.

5.5.3. Extrapolation to the Population

As noted above, the choice of the membership of four rural electric cooperatives (minus about 3% of members for whom the survey questions would not have had the same meaning as for farmers or rural householders) was one of convenience. No independent study was made to see how representative these 19,466 rural electric cooperative customers were of the entire West-Central Illinois rural economy; nor was the "rural economy" defined any further, or its total number of households determined. To the extent that our sample was representative of a population of N households (whether N be the 19,466 rural cooperative members or all West-Central Illinois rural households), the energy end uses and sources in that population should be N times the respective energy intensivity index amounts.

5.5.4. Reliability and Statistical Error

In the sense of being honest answers, the responses to te Questionnaire appear reliable, as evidenced by good internl consistency. (For example, there are precisely the same number f respondents who checked that they use electricity for mechanicl equipment for crop drying as checked either electric heat for crp drying, the use of an amount of LP for crop drying, or both). In te sense that some answers depend on the respondents' recollections of te amount of fuel purchased or dollars paid, the individual answers must e treated with caution. As predicted by the Central Limit Theore, however, the averaging of many "best-guess" answers yields a goo approximation to actuality. For example, 123 respondents reporte residential electricity use averaging 11559 $\pm$ 812 KWH (DATA, p.98). Te rural cooperatives released residential meter data on 272 of the surv respondents, averaging 11248 $\pm$ 530 KWH (DATA, p.95 and Table 9). Te two measures agree within 3 percent.

Direct numerical results from the data collected are given as te statistical mean + the standard error of the mean from the descriptre statistics, and the sources are appended as tables or referenced to te DATA volumes. Results computed from the data (other than by te Statistical Analysis Package) by addition or subtraction are accompanied by an error that is the square root of the sum of the squares of te standard errors of each of the terms in the sum or difference. Errors in values computed by division or multiplication are the same percent

error as the sums of the percent errors in the terms multiplied or divided.

The procedure as well as the statistical meaning of the stated error can best be illustrated by reference to Table C in Section 2.7. The amount of LP usage for household purposes in 956 ± 81 gallons (Table 28). The number of known LP users is 171. The number of known NG users is 32. There are 48 gas users who may be using either LP or NG. If the ratio of NG users to NG + LP users is the same among the 48 unspecified gas users as among the 203 specified users, i.e. 16%, then the 48 unspecified users comprise 40 LP users and 8 NG users. Allowing for the ratio to be anywhere between 0 and 32% gives a number of LP users among the 48 unspecified gas users equal to anywhere from 32 to 48 or 40 ± 8. The total number of LP users is then 211 ± 8 or 60 ± 2 percent of all respondents. (This is one of the rare instances in which an uncertainty is associated with a number -or percentage- of respondents. Ordinarily the statistical error is attributed to the average value for an exact number of respondents).

The energy value of 956 ± 81 gallons of LP is 88 ± 7 mmBTU, with the same percentage error. To obtain the energy intensivity index we must multiply (.60 ± .02) by 88 ± 7. The percentage error propagates as the sum of the percentages 3.3% ± 8.0%, or 11.3%. Thus the E.I.I. of .60 X 88 (= 52.8) carries an uncertainty of 6.0. Since it is not reasonable to carry the .8 in light of a ± 6.0 uncertainty the number is rounded to 53 ± 6.

The combined energy intensivity for "gas" is (53 ± 6) + (13 ± 4) or

66 ± 7.2 (where 7.2 is the square root of 6 X 6 ± 4 X 4), or about 66 ± 7 mmBTU.

The interpretation of the standard error is that we believe that a similar sampling will yield a result between 52 and 80 mmBTU (i.e., a number within twice its standard error) 95 times out of 100. We believe, "at the 95 percent confidence level", that the corresponding value (in this case the per capita use of gas, both LP and natural) in the population lies between 52 and 80 mmBTU. All statistical results in this Report are to be understood in this manner.

TABLE 1

8. Primary fuel & system for home heat.	Number	Percent
01 = elec.furnace-cen	12	3.5 %
02 = elec.heat pump	6	1.7 %
03 = elec.ceiling cab	6	1.7 %
04 = elec.baseboard	12	3.5 %
05 = elec.space heatr	2	0.6 %
06 = LP or NG central	180	52.3 %
07 = LP or NG sp.htrs	16	4.7 %
08 = oil (central)	36	10.5 %
09 = wood (central)	29	8.4 %
10 = wood stove	36	10.5 %
11 = fp w/inserts	1	0.3 %
12 = fp w/o inserts	0	0.0 %
13 = kerosene sp.htrs	2	0.6 %
14 = other	6	1.7 %
Total	344	100.0 %

Missing cases = 9
Response percent = 97.5 %

TABLE 2

Primary Fuel	Number	Percent
1 = electric	38	11.0 %
2 = gas	196	57.0 %
3 = oil	36	10.5 %
4 = wood	66	19.2 %
5 = fp w/o insert	0	0.0 %
6 = kerosene	2	0.6 %
7 = other	6	1.7 %
Total	344	100.0 %

Missing cases = 9
Response percent = 97.5 %

TABLE 3

Secondary Heating Source

Fuel and System	Number of Times Checked as Secondary Heating System *
Electric furnace	7
Electric heat pump	6
Electric ceiling cable	3
Electric baseboard	13
Electric space heaters	30
LP or natural gas (central heating)	18
LP or natural gas space heaters	17
Oil (central heating)	8
Wood (central heating)	11
Wood burning stove	37
Fireplace with inserts	33
Fireplace without inserts	14
Kerosene space heaters	69
Other	6

* Respondents were asked to check as many secondary systems as applied. Of the 353 respondents, 205 checked a total of 272 secondary systems.

TABLE 4

Frequency Distribution of Secondary Fuels

Secondary Fuel	Number	Percent
1 = electric	40.0	19.5%
2 = gas	31.5	15.4%
3 = oil	6.5	3.2%
4 = wood	60.0	29.3%
5 = fireplace without insert	7.5	3.6%
6 = kerosene	55.0	26.8%
7 = other	4.5	2.2%
Total	205.0	100.0%

Missing cases = 148
Response percent = 58.1%

TABLE 5

6. What type air conditioning in home?	Number	Percent
1 = no A/C	125	35.8 %
2 = central A/C	108	30.9 %
3 = window A/C	116	33.2 %
Total	349	100.0 %

Missing cases = 4
Response percent = 98.9 %

TABLE 6

6A. How many window A/C units?	Number	Percent
1 =	70	70.7 %
2 =	24	24.2 %
3 =	4	4.0 %
*9 =	1	1.0 %
Total	99	100.0 %

Missing cases = 254
Response percent = 28.0 %

* This respondent has a small motel attached to the residence. The actual number of units reported was 13, coded as 9.

TABLE 7

9. What fuel for hot water heater?	Number	Percent
1 = electricity	171	51.2 %
2 = oil	2	0.6 %
3 = LP or NG	158	47.3 %
5 = no heater	2	0.6 %
9 = Other:APPENDIX I	1	0.3 %
Total	334	100.0 %

Missing cases = 19
Response percent = 94.6 %

TABLE 8

HOT WATER FUEL vs. PRIMARY HEATING FUEL (N = 353)

	9. What fuel for hot water heater?				
	elect ricit	oil	LP or NG	no he	Other :APPE
Primary Fuel					
electric	34	0	3	0	0
	91.9	0.0	8.1	0.0	0.0
	20.1	0.0	1.9	0.0	0.0
gas	72	1	113	0	0
	38.7	0.5	60.8	0.0	0.0
	42.6	50.0	70.2	0.0	0.0
oil	27	0	9	0	0
	75.0	0.0	25.0	0.0	0.0
	16.0	0.0	5.6	0.0	0.0
wood	32	1	28	0	1
	51.6	1.6	45.2	0.0	1.6
	18.9	50.0	17.4	0.0	100.0
kerosene	2	0	0	0	0
	100.0	0.0	0.0	0.0	0.0
	1.2	0.0	0.0	0.0	0.0
other	1	0	4	1	0
	16.7	0.0	66.7	16.7	0.0
	0.6	0.0	2.5	50.0	0.0

TABLE 9

Total 1984 KWH from Coop on Resid. Meter

Minimum	= 111
Maximum	= 71280
Range	= 71169
Sum	= 3059493
Mean	= 11248.136
Median	= 9578.5
Modes (Bimodal)	= 420 & 10200
Variance	= 76227455.970
Standard deviation	= 8730.834
Standard error of the mean	= 530.360
95 Percent confidence interval around the mean	= 10208.630 - 12
99 Percent confidence interval around the mean	= 9882.458 - 121

* Unbiased estimates of population *

Variance	= 76508738.096
Standard deviation	= 8746.927

* Data distribution coefficients *

Skewness	= 2.253
Kurtosis	= 12.351

Kolmogorov-Smirnov statistic for normality = 14.197

Valid cases	= 272
Missing cases	= 81
Response percent	= 77.1 %

TABLE 10

DISTRIBUTION OF KWH ON COOP RESIDENTIAL METER

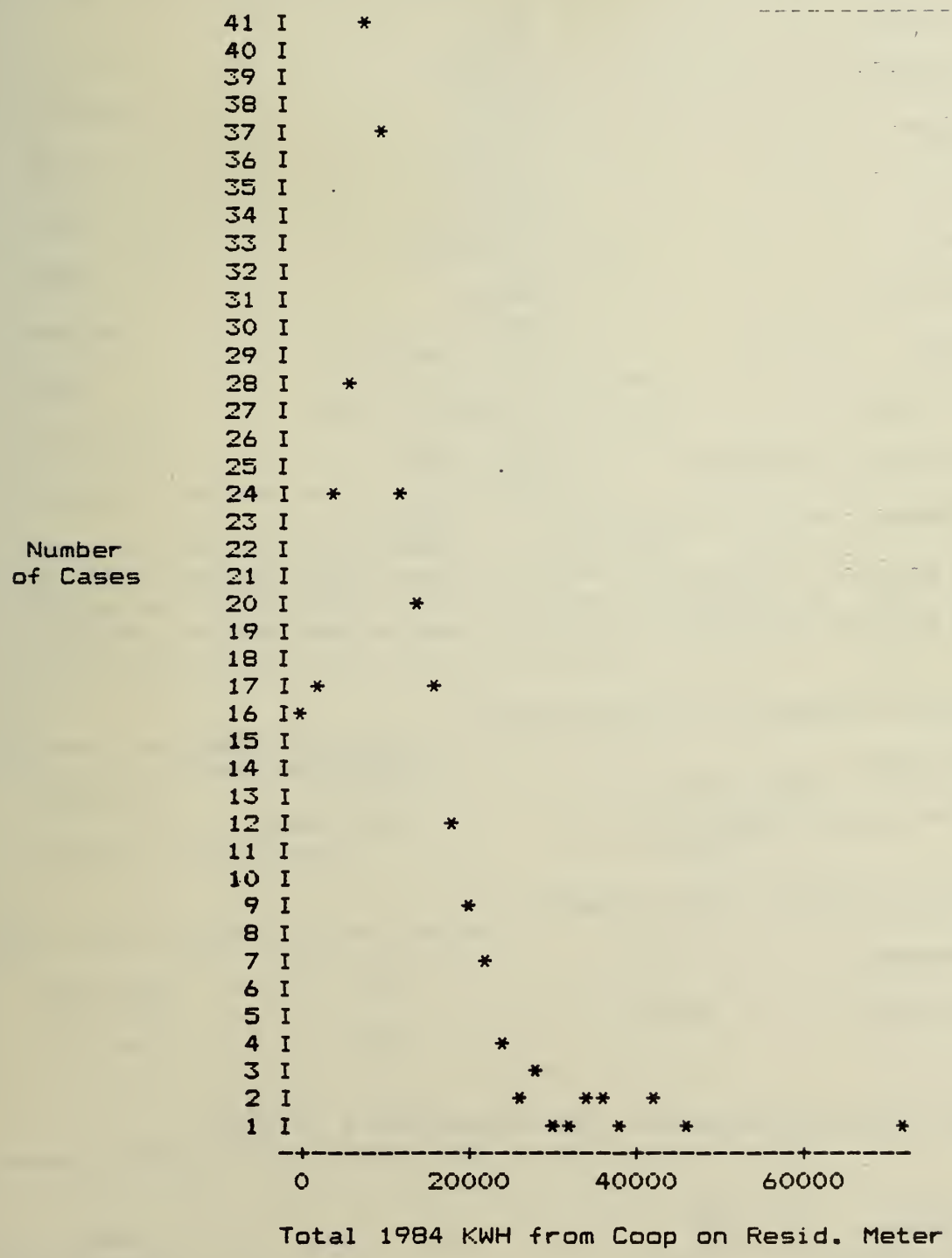

TABLE 11

No PRI or SEC Electric Heat, no el. h.w., no A/C: NON-FARMERS

Total 1984 KWH from Coop on Resid. Meter

Minimum	=	226
Maximum	=	15397
Range	=	15171
Sum	=	201731
Mean	=	5763.743
Median	=	5920
Mode	=	Multi-Modal
Variance	=	14753139.734
Standard deviation	=	3840.982
Standard error of the mean	=	658.723
95 Percent confidence interval around the mean	=	4472.646 - 7054.8
99 Percent confidence interval around the mean	=	4067.531 - 7459.9

* Unbiased estimates of population *

Variance	=	15187055.608
Standard deviation	=	3897.057

* Data distribution coefficients *

Skewness	=	0.465
Kurtosis	=	2.573

Kolmogorov-Smirnov statistic for normality = 5.033

Valid cases	=	35
Missing cases	=	10
Response percent	=	77.8 %

TABLE 12

No PRI or SEC electric heat, el. h.w., or A/C: FARMERS

Total 1984 KWH from Coop on Resid. Meter

Minimum	= 2103
Maximum	= 27550
Range	= 25447
Sum	= 182212
Mean	= 10122.889
Median	= 8784.5
Mode	= Multi-Modal
Variance	= 37807592.877
Standard deviation	= 6148.788
Standard error of the mean	= 1491.300
95 Percent confidence interval around the mean	= 7199.941 - 13045.837
99 Percent confidence interval around the mean	= 6282.791 - 13962.987

* Unbiased estimates of population *

Variance	= 40031568.928
Standard deviation	= 6327.051

* Data distribution coefficients *

Skewness	= 1.439
Kurtosis	= 4.640

Kolmogorov-Smirnov statistic for normality = 3.658

Valid cases	= 18
Missing cases	= 4
Response percent	= 81.8 %

TABLE 13

Residential KWH from Coop - NON-FARMERS ONLY

Total 1984 KWH from Coop on Resid. Meter

Minimum	= 111
Maximum	= 42310
Range	= 42199
Sum	= 1557181
Mean	= 9380.608
Median	= 7910.5
Modes (Bimodal)	= 420 & 10200
Variance	= 55719373.130
Standard deviation	= 7464.541
Standard error of the mean	= 581.114
95 Percent confidence interval around the mean	= 8241.626 - 10519
99 Percent confidence interval around the mean	= 7884.241 - 10876

* Unbiased estimates of population *

Variance	= 56057066.300
Standard deviation	= 7487.127

* Data distribution coefficients *

Skewness	= 1.754
Kurtosis	= 7.543

Kolmogorov-Smirnov statistic for normality = 12.054

Valid cases	= 166
Missing cases	= 51
Response percent	= 76.5 %

TABLE 14

Residential KWH from Coop - NON-FARMERS ONLY

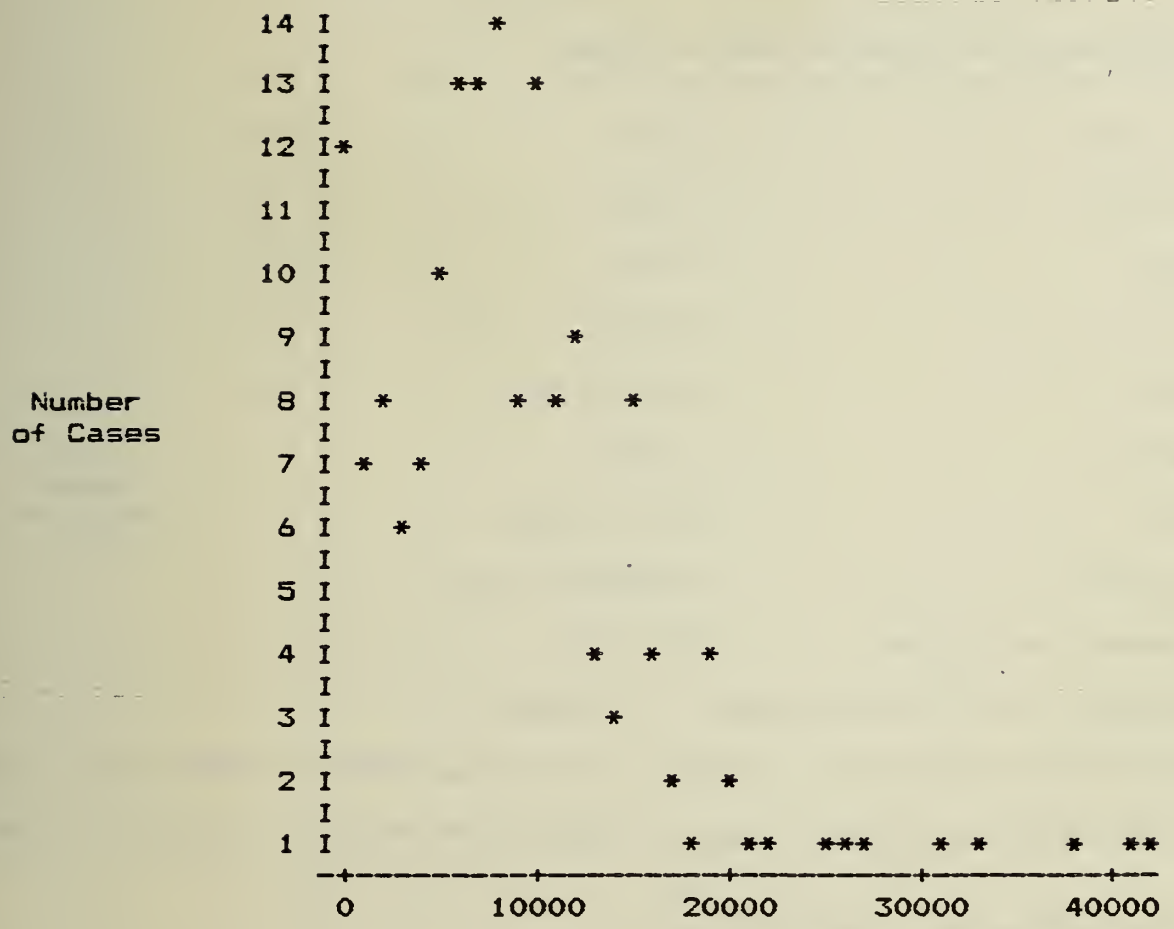

TABLE 15

Residential KWH from Coop - FARMERS ONLY

Total 1984 KWH from Coop on Resid. Meter

Minimum	= 1249
Maximum	= 71280
Range	= 70031
Sum	= 1502312
Mean	= 14172.755
Median	= 11754.5
Mode	= Multi-Modal
Variance	= 94328687.015
Standard deviation	= 9712.296
Standard error of the mean	= 947.823
95 Percent confidence interval around the mean	= 12315.022 - 16030.8
99 Percent confidence interval around the mean	= 11732.111 - 16613.9

* Unbiased estimates of population *

Variance	= 95227055.463
Standard deviation	= 9758.435

* Data distribution coefficients *

Skewness	= 2.566
Kurtosis	= 13.683

Kolmogorov-Smirnov statistic for normality = 8.453

Valid cases	= 106
Missing cases	= 30
Response percent	= 77.9 %

TABLE 16

Residential KWH from Coop - FARMERS ONLY

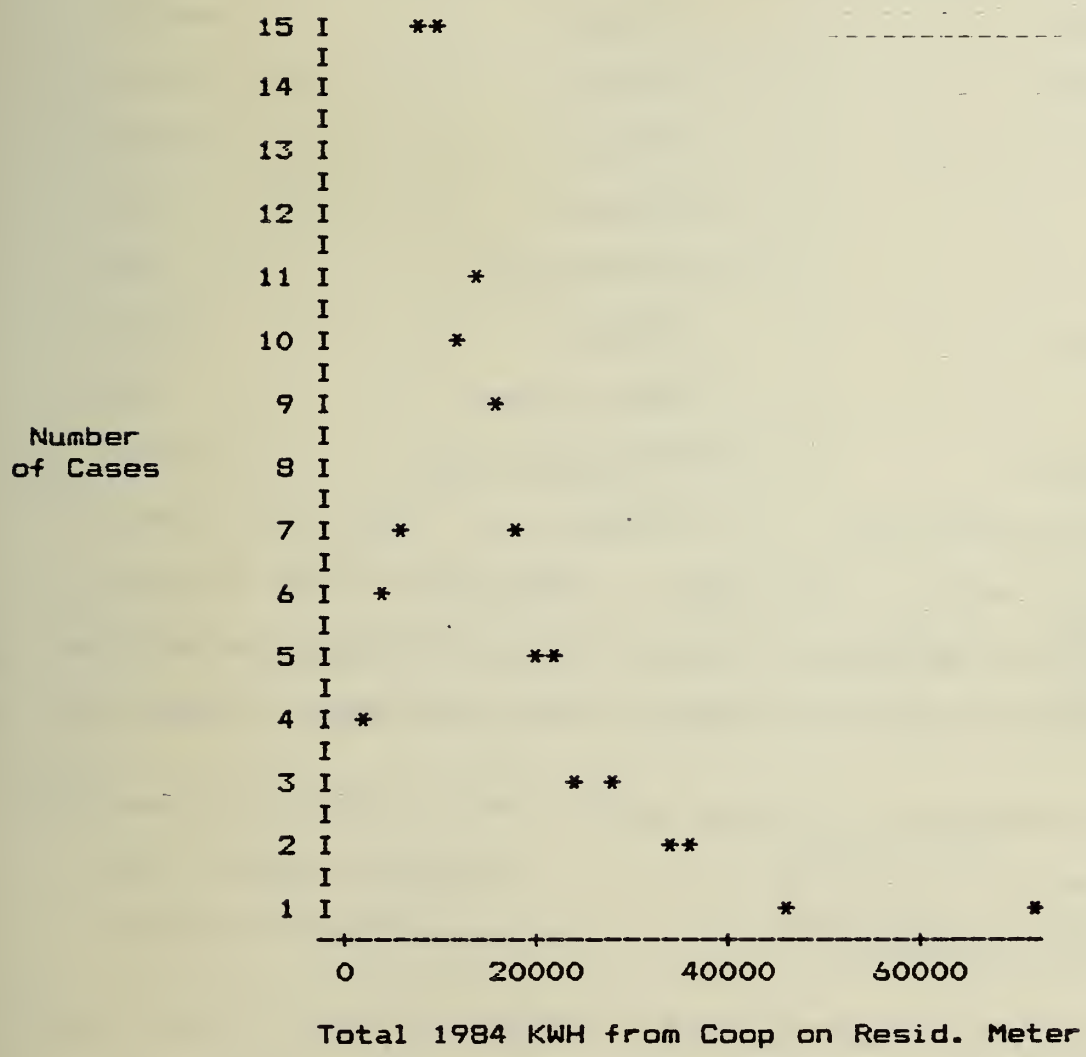

TABLE 17

Electric Heat as Primary Source: ALL

Total 1984 KWH from Coop on Resid. Meter

Minimum	=	1456
Maximum	=	46920
Range	=	45464
Sum	=	637810
Mean	=	21993.448
Median	=	17760
Mode	=	Multi-Modal
Variance	=	147966173.006
Standard deviation	=	12164.135
Standard error of the mean	=	2298.805
95 Percent confidence interval around the mean	=	17487.790 - 2649
99 Percent confidence interval around the mean	=	16074.024 - 2791

* Unbiased estimates of population *

Variance	=	153250679.185
Standard deviation	=	12379.446

* Data distribution coefficients *

Skewness	=	0.329
Kurtosis	=	2.123

Kolmogorov-Smirnov statistic for normality = 4.152

Valid cases	=	29
Missing cases	=	9
Response percent	=	76.3 %

TABLE 18

No PRI or SEC Electric Heat: ALL

Total 1984 KWH from Coop on Resid. Meter

Minimum	= 111
Maximum	= 71280
Range	= 71169
Sum	= 2095332
Mean	= 9837.239
Median	= 8901
Mode	= 10200
Variance	= 52508650.191
Standard deviation	= 7246.285
Standard error of the mean	= 497.677
95 Percent confidence interval around the mean	= 8861.793 - 10812.68
99 Percent confidence interval around the mean	= 8555.721 - 11118.75

* Unbiased estimates of population *

Variance	= 52756332.504
Standard deviation	= 7263.355

* Data distribution coefficients *

Skewness	= 3.167
Kurtosis	= 25.682

Kolmogorov-Smirnov statistic for normality = 13.414

Valid cases	= 213
Missing cases	= 62
Response percent	= 77.5 %

TABLE 19

List of all gas users

Respondent #

001 - 1
004 - 1
006 - 1
007 - 1
008 - 1
012 - 1
017 - 1
019 - 1
023 - 1
024 - 1
025 - 1
026 - 1
031 - 1
032 - 1
033 - 1
034 - 1
037 - 1
038 - 1
040 - 1
042 - 1
043 - 1
044 - 1
046 - 1
052 - 1
056 - 1
059 - 1
062 - 1
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464 - 1
468 - 1
469 - 1
472 - 1
473 - 1
474 - 1
475 - 1
476 - 1
477 - 1

TABLE 19 (CONT.)

List of all gas users (Continued)

Respondent #				Number	Percent
478 - 1	479 - 1	482 - 1	483 - 1		
486 - 1	489 - 1	493 - 1	494 - 1		
495 - 1	500 - 1	502 - 1	507 - 1		
511 - 1	514 - 1	520 - 1	523 - 1		
527 - 1	529 - 1	537 - 1	541 - 1		
552 - 1	554 - 1	556 - 1	557 - 1		
561 - 1	562 - 1	563 - 1	567 - 1		
569 - 1	572 - 1	578 - 1	580 - 1		
581 - 1	582 - 1	583 - 1	587 - 1		
588 - 1	589 - 1	590 - 1	592 - 1		
593 - 1	601 - 1	602 - 1			

Valid cases = 251
Missing cases = 0
Response percent = 100.0 %

TABLE 20

11c. 1984 LP used (Gallons).

00020 - 1	00090 - 1	00100 - 2	00175 - 1
00200 - 1	00210 - 1	00240 - 1	00250 - 2
00283 - 1	00300 - 11	00333 - 1	00350 - 1
00400 - 4	00425 - 2	00450 - 2	00500 - 2
00520 - 1	00534 - 1	00550 - 1	00553 - 1
00600 - 5	00650 - 2	00700 - 5	00725 - 1
00740 - 1	00750 - 2	00800 - 6	00850 - 1
00900 - 1	01000 - 14	01085 - 1	01090 - 1
01100 - 1	01115 - 1	01160 - 1	01185 - 1
01190 - 1	01200 - 9	01210 - 1	01250 - 2
01300 - 1	01320 - 1	01340 - 1	01365 - 1
01400 - 1	01428 - 2	01500 - 7	01540 - 1
01543 - 1	01610 - 1	01625 - 2	01645 - 1
01700 - 1	01774 - 1	01800 - 1	01825 - 1
01900 - 1	02000 - 3	02093 - 1	02200 - 2
02300 - 1	02400 - 2	02500 - 2	03000 - 3
04200 - 1	05500 - 1		

Valid cases = 146
Missing cases = 207
Response percent = 41.4 %

TABLE 21

11c. 1984 LP used (Gallons).

Minimum	= 20
Maximum	= 5500
Range	= 5480
Sum	= 153119
Mean	= 1048.760
Median	= 1000
Mode	= 1000
Variance	= 619886.032
Standard deviation	= 787.328
Standard error of the mean	= 65.384
95 Percent confidence interval around the mean	= 920.608 - 1176.913
99 Percent confidence interval around the mean	= 880.396 - 1217.124

* Unbiased estimates of population *

Variance	= 624161.108
Standard deviation	= 790.039

* Data distribution coefficients *

Skewness	= 2.067
Kurtosis	= 10.270

Kolmogorov-Smirnov statistic for normality = 10.259

Valid cases	= 146
Missing cases	= 207
Response percent	= 41.4 %

TABLE 22

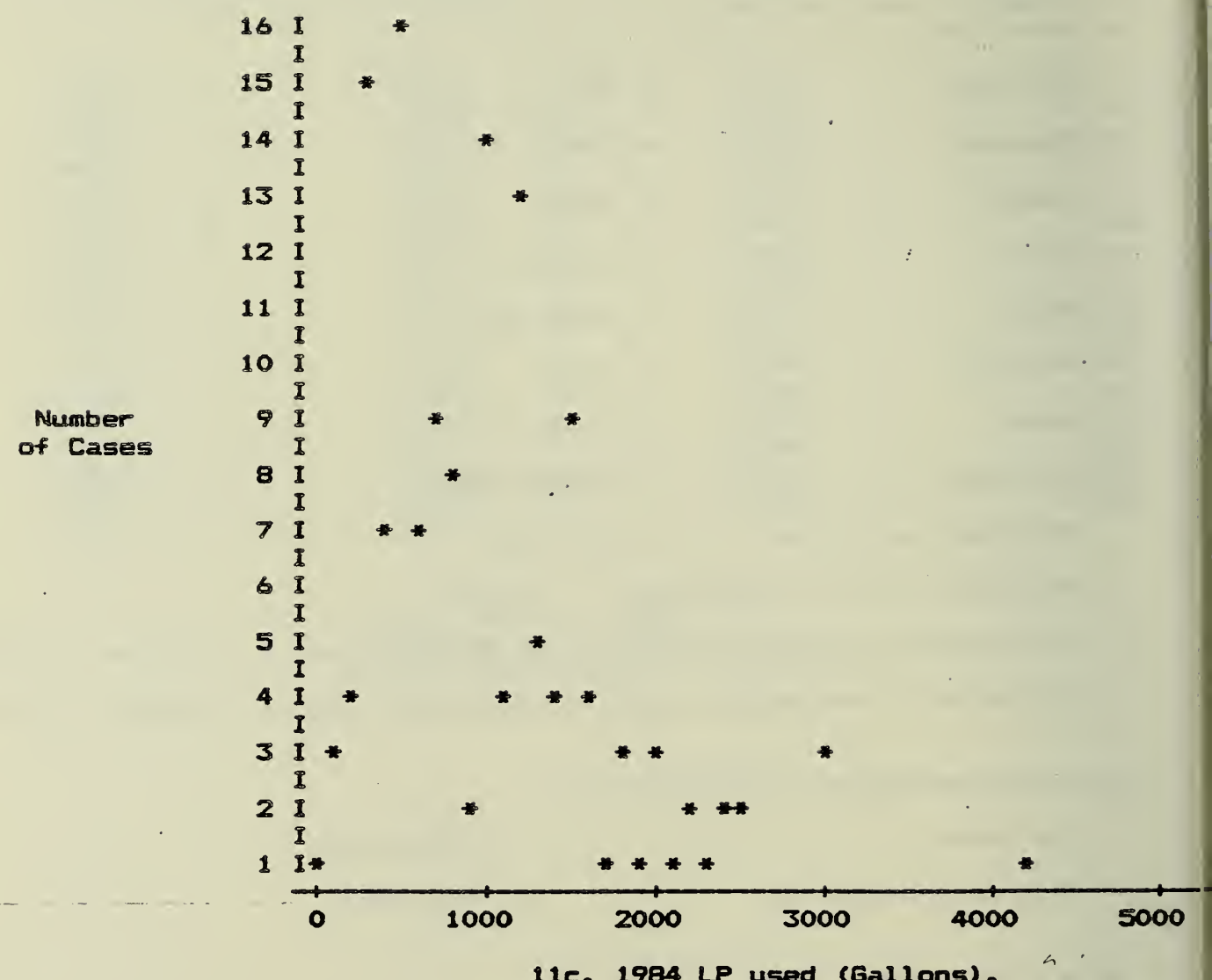

Number of Cases
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
1000
2000
3000
4000
5000
11c. 1984 LP used (Gallons).

TABLE 23

11c. 1984 $ paid for LP.

00046 - 1	00075 - 1	00100 - 1	00110 - 1
00120 - 2	00121 - 1	00126 - 1	00140 - 1
00170 - 1	00175 - 1	00190 - 1	00195 - 1
00210 - 2	00220 - 1	00222 - 1	00224 - 1
00230 - 1	00232 - 1	00250 - 1	00252 - 1
00268 - 1	00270 - 1	00275 - 1	00280 - 2
00290 - 2	00300 - 4	00325 - 2	00333 - 1
00350 - 6	00360 - 2	00375 - 1	00392 - 1
00400 - 2	00410 - 1	00412 - 1	00416 - 1
00419 - 1	00422 - 1	00450 - 1	00467 - 1
00469 - 1	00483 - 1	00490 - 2	00500 - 5
00520 - 1	00550 - 1	00600 - 6	00609 - 1
00610 - 1	00617 - 1	00630 - 1	00650 - 2
00698 - 1	00700 - 4	00720 - 1	00730 - 2
00750 - 1	00780 - 1	00800 - 5	00809 - 1
00815 - 1	00850 - 2	00857 - 1	00867 - 1
00871 - 1	00878 - 1	00885 - 1	00890 - 1
00891 - 1	00894 - 1	00900 - 1	00904 - 1
00913 - 1	00947 - 1	00949 - 1	00950 - 1
00960 - 1	00966 - 1	00968 - 1	01000 - 5
01005 - 1	01006 - 1	01013 - 1	01041 - 1
01050 - 1	01062 - 1	01080 - 1	01100 - 1
01125 - 1	01130 - 1	01175 - 1	01196 - 1
01200 - 3	01250 - 1	01300 - 1	01317 - 1
01318 - 1	01322 - 1	01351 - 1	01375 - 1
01390 - 1	01500 - 4	01540 - 1	01650 - 1
01728 - 1	01750 - 1	01760 - 1	01788 - 1
01800 - 1	02000 - 2	02194 - 1	02200 - 1
02400 - 1	02500 - 1	02750 - 1	03500 - 1

Valid cases = 161
Missing cases = 192
Response percent = 45.6 %

TABLE 24

11c. 1984 $ paid for LP.

Minimum	= 46
Maximum	= 3500
Range	= 3454
Sum	= 127913
Mean	= 794.491
Median	= 700
Modes (Bimodal)	= 350 & 600
Variance	= 325939.989
Standard deviation	= 570.912
Standard error of the mean	= 45.135
95 Percent confidence interval around the mean	= 706.027 - 882
99 Percent confidence interval around the mean	= 678.269 - 910

* Unbiased estimates of population *

Variance	= 327977.114
Standard deviation	= 572.693

* Data distribution coefficients *

Skewness	= 1.514
Kurtosis	= 6.284

Kolmogorov-Smirnov statistic for normality = 11.432

Valid cases	= 161
Missing cases	= 192
Response percent	= 45.6 %

TABLE 25

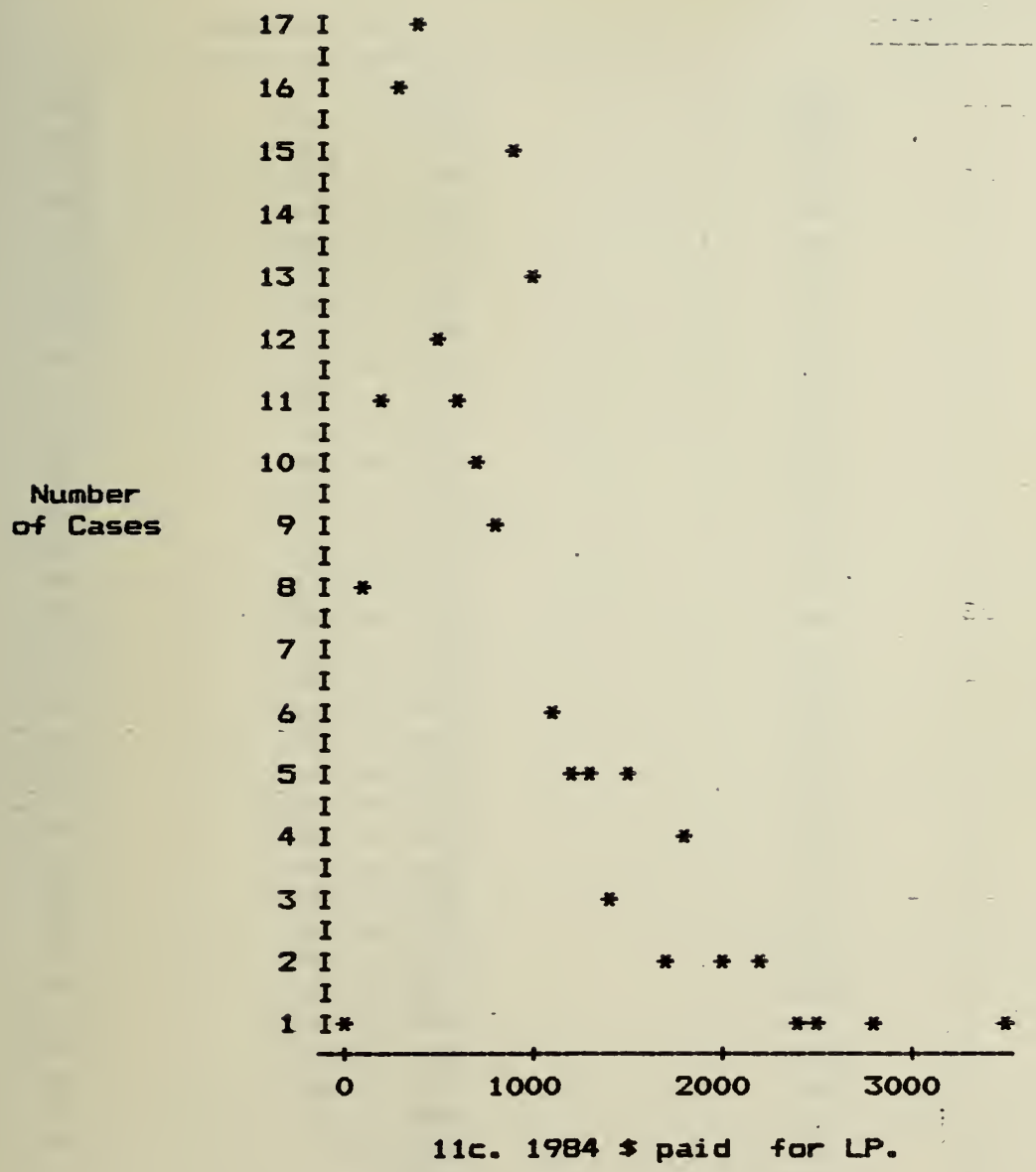

Number of Cases
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
1000
2000
3000
11c. 1984 $ paid for LP.

TABLE 26

List of all known LP users in sample

Respondent #

007 - 1	008 - 1	012 - 1	017 - 1
019 - 1	023 - 1	025 - 1	026 - 1
031 - 1	032 - 1	033 - 1	034 - 1
038 - 1	040 - 1	042 - 1	043 - 1
044 - 1	046 - 1	050 - 1	052 - 1
056 - 1	059 - 1	062 - 1	063 - 1
066 - 1	069 - 1	070 - 1	073 - 1
076 - 1	077 - 1	083 - 1	084 - 1
085 - 1	087 - 1	092 - 1	094 - 1
097 - 1	101 - 1	103 - 1	105 - 1
106 - 1	113 - 1	114 - 1	116 - 1
119 - 1	120 - 1	123 - 1	124 - 1
127 - 1	135 - 1	136 - 1	137 - 1
144 - 1	149 - 1	153 - 1	155 - 1
158 - 1	160 - 1	163 - 1	164 - 1
166 - 1	171 - 1	173 - 1	178 - 1
181 - 1	182 - 1	183 - 1	186 - 1
192 - 1	199 - 1	207 - 1	208 - 1
213 - 1	215 - 1	218 - 1	224 - 1
225 - 1	227 - 1	231 - 1	232 - 1
234 - 1	236 - 1	240 - 1	242 - 1
244 - 1	245 - 1	254 - 1	255 - 1
256 - 1	259 - 1	260 - 1	261 - 1
264 - 1	269 - 1	272 - 1	275 - 1
278 - 1	280 - 1	289 - 1	294 - 1
302 - 1	303 - 1	304 - 1	307 - 1
311 - 1	312 - 1	313 - 1	319 - 1
327 - 1	336 - 1	338 - 1	350 - 1
355 - 1	363 - 1	369 - 1	376 - 1
378 - 1	382 - 1	385 - 1	386 - 1
393 - 1	396 - 1	400 - 1	403 - 1
404 - 1	405 - 1	407 - 1	409 - 1
410 - 1	417 - 1	420 - 1	437 - 1
443 - 1	447 - 1	450 - 1	451 - 1
453 - 1	458 - 1	459 - 1	462 - 1
463 - 1	464 - 1	468 - 1	472 - 1
473 - 1	475 - 1	476 - 1	478 - 1
483 - 1	500 - 1	507 - 1	520 - 1
523 - 1	529 - 1	537 - 1	552 - 1
562 - 1	567 - 1	569 - 1	572 - 1
576 - 1	578 - 1	581 - 1	582 - 1
583 - 1	587 - 1	589 - 1	590 - 1
593 - 1	601 - 1	602 - 1	

Valid cases = 171
Missing cases = 0
Response percent = 100.0 %

TABLE 27

List of all known Natural Gas Users in sample

Respondent #	Number	Percent
001 =	1	3.1 %
024 =	1	3.1 %
065 =	1	3.1 %
074 =	1	3.1 %
093 =	1	3.1 %
159 =	1	3.1 %
188 =	1	3.1 %
198 =	1	3.1 %
252 =	1	3.1 %
258 =	1	3.1 %
262 =	1	3.1 %
288 =	1	3.1 %
329 =	1	3.1 %
330 =	1	3.1 %
335 =	1	3.1 %
356 =	1	3.1 %
373 =	1	3.1 %
375 =	1	3.1 %
401 =	1	3.1 %
419 =	1	3.1 %
430 =	1	3.1 %
432 =	1	3.1 %
434 =	1	3.1 %
446 =	1	3.1 %
456 =	1	3.1 %
479 =	1	3.1 %
486 =	1	3.1 %
494 =	1	3.1 %
561 =	1	3.1 %
563 =	1	3.1 %
580 =	1	3.1 %
588 =	1	3.1 %
Total	32	100.0 %

Missing cases = 0
Response percent = 100.0 %

TABLE 28

Household LP usage by NON-FARMERS

11c. 1984 LP used (Gallons).

Minimum	= 20
Maximum	= 4200
Range	= 4180
Sum	= 72635
Mean	= 955.724
Median	= 800
Mode	= 300
Variance	= 491282.542
Standard deviation	= 700.916
Standard error of the mean	= 80.935
95 Percent confidence interval around the mean	= 797.092 - 1114.35
99 Percent confidence interval around the mean	= 747.317 - 1164.13

* Unbiased estimates of population *

Variance	= 497832.976
Standard deviation	= 705.573

* Data distribution coefficients *

Skewness	= 1.736
Kurtosis	= 7.880

Kolmogorov-Smirnov statistic for normality = 7.765

Valid cases	= 76
Missing cases	= 141
Response percent	= 35.0 %

TABLE 29

Amount Paid for household LP by NON-FARMERS

11c. 1984 $ paid for LP.

Minimum	=	46
Maximum	=	2500
Range	=	2454
Sum	=	66126
Mean	=	742.989
Median	=	700
Mode	=	1000
Variance	=	230499.674
Standard deviation	=	480.104
Standard error of the mean	=	51.179
95 Percent confidence interval around the mean	=	642.677 - 843.300
99 Percent confidence interval around the mean	=	611.202 - 874.775

* Unbiased estimates of population *

Variance	=	233118.989
Standard deviation	=	482.824

* Data distribution coefficients *

Skewness	=	0.975
Kurtosis	=	4.310

Kolmogorov-Smirnov statistic for normality = 8.839

Valid cases	=	89
Missing cases	=	128
Response percent	=	41.0 %

TABLE 30

1984 Natural Gas used (Therms).	Number	Percent
000031 =	1	5.3 %
000130 =	1	5.3 %
000537 =	1	5.3 %
000540 =	1	5.3 %
000610 =	1	5.3 %
001090 =	1	5.3 %
001092 =	2	10.5 %
001161 =	1	5.3 %
001263 =	1	5.3 %
001300 =	1	5.3 %
001308 =	1	5.3 %
001311 =	1	5.3 %
001318 =	1	5.3 %
001350 =	1	5.3 %
001430 =	1	5.3 %
001500 =	1	5.3 %
001712 =	1	5.3 %
003397 =	1	5.3 %
Total	19	100.0 %

Missing cases = 334
Response percent = 5.4 %

TABLE 31

1984 Natural Gas used (Therms).

Minimum	= 31
Maximum	= 3397
Range	= 3366
Sum	= 22172
Mean	= 1166.947
Median	= 1263
Mode	= 1092
Variance	= 476692.260
Standard deviation	= 690.429
Standard error of the mean	= 162.736
95 Percent confidence interval around the mean	= 847.985 - 1485.9(
99 Percent confidence interval around the mean	= 747.903 - 1585.9(

* Unbiased estimates of population *

Variance	= 503175.164
Standard deviation	= 709.348

* Data distribution coefficients *

Skewness	= 1.291
Kurtosis	= 6.501

Kolmogorov-Smirnov statistic for normality = 3.839

Valid cases	= 19
Missing cases	= 334
Response percent	= 5.4 %

TABLE 32

11d. 1984 $ paid for natural gas.

Minimum	=	18
Maximum	=	1698
Range	=	1680
Sum	=	21241
Mean	=	663.781
Median	=	672.5
Modes (Bimodal)	=	600 & 800
Variance	=	112146.483
Standard deviation	=	334.883
Standard error of the mean	=	60.147
95 Percent confidence interval around the mean	=	545.894 - 781.6
99 Percent confidence interval around the mean	=	508.903 - 818.8

* Unbiased estimates of population *

Variance	=	115764.112
Standard deviation	=	340.241

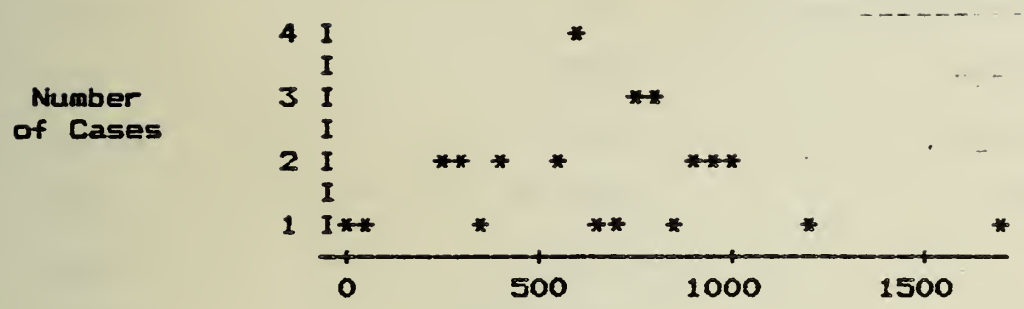
* Data distribution coefficients *

Skewness	=	0.525
Kurtosis	=	4.169

Kolmogorov-Smirnov statistic for normality = 4.554

Valid cases	=	32
Missing cases	=	321
Response percent	=	9.1 %

TABLE 33



11d. 1984 $ paid for natural gas.

TABLE 34

LP used for primary heat and hot water

11c. 1984 $ paid for LP.

Minimum	= 75
Maximum	= 2750
Range	= 2675
Sum	= 56277
Mean	= 922.574
Median	= 878
Mode	= Multi-Modal
Variance	= 232659.556
Standard deviation	= 482.348
Standard error of the mean	= 62.271
95 Percent confidence interval around the mean	= 800.523 - 1044.6
99 Percent confidence interval around the mean	= 762.226 - 1082.9

* Unbiased estimates of population *

Variance	= 236537.215
Standard deviation	= 486.351

* Data distribution coefficients *

Skewness	= 1.055
Kurtosis	= 5.040

Kolmogorov-Smirnov statistic for normality = 7.357

Valid cases	= 61
Missing cases	= 50
Response percent	= 55.0 %

TABLE 35

LP used for primary heat but no hot water

11c. 1984 $ paid for LP.

Minimum	=	175
Maximum	=	2200
Range	=	2025
Sum	=	40991
Mean	=	836.551
Median	=	720
Mode	=	Multi-Modal
Variance	=	216270.492
Standard deviation	=	465.049
Standard error of the mean	=	67.124
95 Percent confidence interval around the mean	=	704.988 - 968.114
99 Percent confidence interval around the mean	=	663.707 - 1009.395

* Unbiased estimates of population *

Variance	=	220776.128
Standard deviation	=	469.868

* Data distribution coefficients *

Skewness	=	0.902
Kurtosis	=	3.388

Kolmogorov-Smirnov statistic for normality = 6.052

Valid cases	=	49
Missing cases	=	31
Response percent	=	61.3 %

TABLE 36

11b. 1984 oil used (Gallons).	Number	Percent
00004 =	1	2.0 %
00005 =	1	2.0 %
00010 =	1	2.0 %
00035 =	1	2.0 %
00040 =	1	2.0 %
00050 =	1	2.0 %
00060 =	1	2.0 %
00070 =	1	2.0 %
00100 =	5	9.8 %
00200 =	2	3.9 %
00300 =	4	7.8 %
00350 =	1	2.0 %
00400 =	2	3.9 %
00450 =	1	2.0 %
00498 =	1	2.0 %
00500 =	3	5.9 %
00512 =	1	2.0 %
00550 =	2	3.9 %
00600 =	1	2.0 %
00650 =	1	2.0 %
00700 =	3	5.9 %
00750 =	1	2.0 %
00800 =	2	3.9 %
00826 =	1	2.0 %
00900 =	1	2.0 %
00917 =	1	2.0 %
00924 =	1	2.0 %
00950 =	1	2.0 %
01000 =	4	7.8 %
01200 =	1	2.0 %
01500 =	2	3.9 %
01800 =	1	2.0 %
Total	51	100.0 %

Missing cases = 302
Response percent = 14.4 %

TABLE 37

11b. 1984 oil used (Gallons).

Minimum	= 4
Maximum	= 1800
Range	= 1796
Sum	= 27801
Mean	= 545.118
Median	= 500
Mode	= 100
Variance	= 180857.633
Standard deviation	= 425.274
Standard error of the mean	= 60.143
95 Percent confidence interval around the mean	= 427.238 - 662.99
99 Percent confidence interval around the mean	= 390.250 - 699.98

* Unbiased estimates of population *

Variance	= 184474.786
Standard deviation	= 429.505

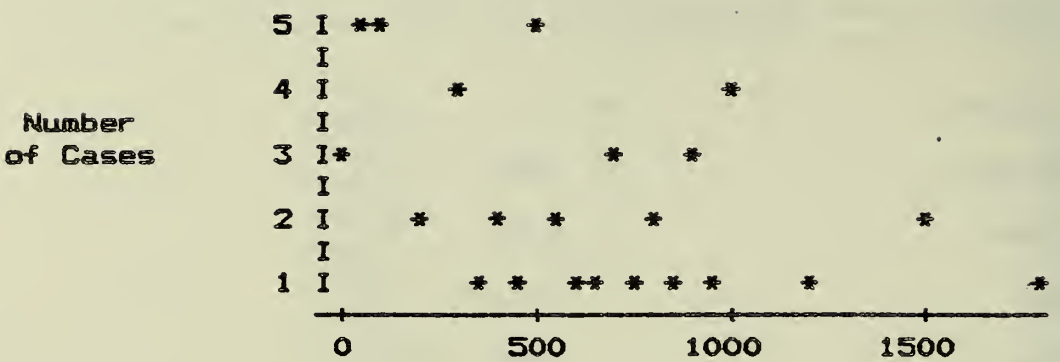
* Data distribution coefficients *

Skewness	= 0.764
Kurtosis	= 3.232

Kolmogorov-Smirnov statistic for normality = 7.018

Valid cases	= 51
Missing cases	= 302
Response percent	= 14.4 %

TABLE 38



11b. 1984 oil used (Gallons).

TABLE 39

11b. 1984 $ paid for oil.

Minimum	= 6
Maximum	= 1700
Range	= 1694
Sum	= 27719
Mean	= 577.479
Median	= 524.5
Mode	= 1000
Variance	= 172766.750
Standard deviation	= 415.652
Standard error of the mean	= 60.629
95 Percent confidence interval around the mean	= 458.646 - 696.312
99 Percent confidence interval around the mean	= 421.359 - 733.599

* Unbiased estimates of population *

Variance	= 176442.638
Standard deviation	= 420.051

* Data distribution coefficients *

Skewness	= 0.504
Kurtosis	= 2.676

Kolmogorov-Smirnov statistic for normality = 6.801

Valid cases	= 48
Missing cases	= 305
Response percent	= 13.6 %

TABLE 40

Respondents who used kerosene

Respondent #

001 - 1	005 - 1	006 - 1	016 - 1
019 - 1	034 - 1	039 - 1	042 - 1
059 - 1	063 - 1	073 - 1	087 - 1
103 - 1	106 - 1	114 - 1	119 - 1
149 - 1	153 - 1	155 - 1	186 - 1
191 - 1	196 - 1	203 - 1	215 - 1
222 - 1	224 - 1	225 - 1	227 - 1
228 - 1	231 - 1	234 - 1	236 - 1
254 - 1	255 - 1	258 - 1	259 - 1
269 - 1	287 - 1	288 - 1	290 - 1
301 - 1	306 - 1	308 - 1	313 - 1
329 - 1	350 - 1	384 - 1	390 - 1
397 - 1	398 - 1	422 - 1	429 - 1
430 - 1	435 - 1	443 - 1	447 - 1
450 - 1	466 - 1	469 - 1	470 - 1
495 - 1	512 - 1	515 - 1	523 - 1
561 - 1	572 - 1	577 - 1	578 - 1
589 - 1	602 - 1		

Valid cases = 70
Missing cases = 0
Response percent = 100.0 %

TABLE 41

11f. Other fuel used: kerosene (gals).	Number	Percent
001 =	1	4.5 %
005 =	1	4.5 %
010 =	1	4.5 %
015 =	2	9.1 %
020 =	2	9.1 %
030 =	2	9.1 %
035 =	1	4.5 %
040 =	1	4.5 %
050 =	2	9.1 %
070 =	2	9.1 %
080 =	1	4.5 %
090 =	1	4.5 %
100 =	1	4.5 %
140 =	1	4.5 %
150 =	1	4.5 %
200 =	1	4.5 %
240 =	1	4.5 %
Total	22	100.0 %

Missing cases = 331
Response percent = 6.2 %

TABLE 42

11f. Other fuel used: kerosene (gals).

Minimum	= 1
Maximum	= 240
Range	= 239
Sum	= 1461
Mean	= 66.409
Median	= 45
Mode	= Multi-Modal
Variance	= 3998.969
Standard deviation	= 63.237
Standard error of the mean	= 13.800
95 Percent confidence interval around the mean	= 39.362 - 93.4
99 Percent confidence interval around the mean	= 30.875 - 101.4

* Unbiased estimates of population *

Variance	= 4189.396
Standard deviation	= 64.726

* Data distribution coefficients *

Skewness	= 1.318
Kurtosis	= 3.915

Kolmogorov-Smirnov statistic for normality = 4.556

Valid cases	= 22
Missing cases	= 331
Response percent	= 6.2 %

TABLE 43

11f. 1984 $ cost of kerosene.

Minimum	= 2
Maximum	= 365
Range	= 363
Sum	= 2033
Mean	= 96.810
Median	= 65
Mode	= 100
Variance	= 9304.154
Standard deviation	= 96.458
Standard error of the mean	= 21.569
95 Percent confidence interval around the mean	= 54.535 - 139.084
99 Percent confidence interval around the mean	= 41.270 - 152.349

* Unbiased estimates of population *

Variance	= 9769.362
Standard deviation	= 98.840

* Data distribution coefficients *

Skewness	= 1.373
Kurtosis	= 4.142

Kolmogorov-Smirnov statistic for normality = 4.448

Valid cases	= 21
Missing cases	= 332
Response percent	= 5.9 %

TABLE 44

11e. 1984 amount of wood used (cords)	Number	Percent
01 =	6	6.2 %
02 =	10	10.3 %
03 =	15	15.5 %
04 =	9	9.3 %
05 =	9	9.3 %
06 =	5	5.2 %
07 =	10	10.3 %
08 =	7	7.2 %
10 =	7	7.2 %
11 =	2	2.1 %
12 =	4	4.1 %
15 =	7	7.2 %
16 =	1	1.0 %
18 =	1	1.0 %
20 =	3	3.1 %
35 =	1	1.0 %
Total	97	100.0 %

Missing cases = 256
Response percent = 27.5 %

TABLE 45

11e. 1984 amount of wood used (cords)

Minimum	= 1
Maximum	= 35
Range	= 34
Sum	= 682
Mean	= 7.031
Median	= 5
Mode	= 3
Variance	= 30.628
Standard deviation	= 5.534
Standard error of the mean	= 0.565
95 Percent confidence interval around the mean	= 5.924 - 8.138
99 Percent confidence interval around the mean	= 5.576 - 8.485

* Unbiased estimates of population *

Variance	= 30.947
Standard deviation	= 5.563

* Data distribution coefficients *

Skewness	= 1.880
Kurtosis	= 8.448

Kolmogorov-Smirnov statistic for normality = 9.383

Valid cases	= 97
Missing cases	= 256
Response percent	= 27.5 %

TABLE 46

11e. 1984 $ paid for wood.

Minimum	= 10
Maximum	= 800
Range	= 790
Sum	= 6613
Mean	= 213.323
Median	= 160
Mode	= 350
Variance	= 35442.154
Standard deviation	= 188.261
Standard error of the mean	= 34.372
95 Percent confidence interval around the mean	= 145.954 - 280.1
99 Percent confidence interval around the mean	= 124.816 - 301.2

* Unbiased estimates of population *

Variance	= 36623.559
Standard deviation	= 191.373

* Data distribution coefficients *

Skewness	= 1.140
Kurtosis	= 4.137

Kolmogorov-Smirnov statistic for normality = 5.079

Valid cases	= 31
Missing cases	= 322
Response percent	= 8.8 %

TABLE 47

11f. Other fuel used: coal (tons).	Number	Percent
002 =	1	33.3 %
017 =	1	33.3 %
018 =	1	33.3 %
Total	3	100.0 %

Missing cases = 350
Response percent = 0.8 %

TABLE 48

Amount Paid for Electricity by NON-FARMERS

11a. 1984 $ paid for electricity.

Minimum	= 90
Maximum	= 6500
Range	= 6410
Sum	= 110358
Mean	= 1137.711
Median	= 962
Mode	= 1200
Variance	= 765358.226
Standard deviation	= 874.848
Standard error of the mean	= 89.289
95 Percent confidence interval around the mean	= 962.705 - 1312.71
99 Percent confidence interval around the mean	= 907.793 - 1367.60

* Unbiased estimates of population *

Variance	= 773330.707
Standard deviation	= 879.392

* Data distribution coefficients *

Skewness	= 2.913
Kurtosis	= 16.770

Kolmogorov-Smirnov statistic for normality = 7.399

Valid cases	= 97
Missing cases	= 120
Response percent	= 44.7 %

TABLE 49

Coop KWH: El.ht.=PRI; El.h.w.=YES; A/C=central: ALL

Total 1984 KWH from Coop on Resid. Meter

Minimum	=	2426
Maximum	=	41470
Range	=	39044
Sum	=	306629
Mean	=	25552.417
Median	=	26115.5
Mode	=	Multi-Modal
Variance	=	125187747.576
Standard deviation	=	11188.733
Standard error of the mean	=	3373.530
95 Percent confidence interval around the mean	=	18940.298 - 32164.535
99 Percent confidence interval around the mean	=	16865.577 - 34239.256

* Unbiased estimates of population *

Variance	=	136568451.902
Standard deviation	=	11686.251

* Data distribution coefficients *

Skewness	=	-0.392
Kurtosis	=	2.253

Kolmogorov-Smirnov statistic for normality = 2.809

Valid cases	=	12
Missing cases	=	3
Response percent	=	80.0 %

TABLE 50

Coop KWH: El.ht.=PRI; El.h.w.=YES; A/C=window: ALL

Total 1984 KWH from Coop on Resid. Meter

Minimum	=	1456
Maximum	=	42310
Range	=	40854
Sum	=	185163
Mean	=	20573.667
Median	=	15881
Mode	=	Multi-Modal
Variance	=	160544670.000
Standard deviation	=	12670.622
Standard error of the mean	=	4479.742
95 Percent confidence interval around the mean	=	11793.373 - 293539
99 Percent confidence interval around the mean	=	9038.332 - 32109.0

* Unbiased estimates of population *

Variance	=	180612753.750
Standard deviation	=	13439.224

* Data distribution coefficients *

Skewness	=	0.235
Kurtosis	=	1.898

Kolmogorov-Smirnov statistic for normality = 2.109

Valid cases	=	9
Missing cases	=	0
Response percent	=	100.0 %

TABLE 51

Coop KWH: El.ht.=PRI; El.h.w.=YES; A/C=NO: ALL

Total 1984 KWH from Coop on Resid. Meter

Minimum	= 11117
Maximum	= 20481
Range	= 9364
Sum	= 92558
Mean	= 15426.333
Median	= 15330
Mode	= Multi-Modal
Variance	= 9137148.222
Standard deviation	= 3022.772
Standard error of the mean	= 1351.825
95 Percent confidence interval around the mean	= 12776.757 - 18075.909
99 Percent confidence interval around the mean	= 11945.385 - 18907.282

* Unbiased estimates of population *

Variance	= 10964577.867
Standard deviation	= 3311.280

* Data distribution coefficients *

Skewness	= 0.251
Kurtosis	= 2.072

Kolmogorov-Smirnov statistic for normality = 2.655

Valid cases	= 6
Missing cases	= 4
Response percent	= 60.0 %

TABLE 52

Coop KWH: El.ht.=NO; El.h.w.=YES; A/C=central: ALL

Total 1984 KWH from Coop on Resid. Meter

Minimum	=	2141
Maximum	=	23340
Range	=	21199
Sum	=	383166
Mean	=	12772.200
Median	=	11497.5
Mode	=	Multi-Modal
Variance	=	25626769.160
Standard deviation	=	5062.289
Standard error of the mean	=	940.043
95 Percent confidence interval around the mean	=	10929.715 - 14614.8
99 Percent confidence interval around the mean	=	10351.588 - 15192.1

* Unbiased estimates of population *

Variance	=	26510450.855
Standard deviation	=	5148.830

* Data distribution coefficients *

Skewness	=	0.350
Kurtosis	=	2.559

Kolmogorov-Smirnov statistic for normality = 4.879

Valid cases	=	30
Missing cases	=	4
Response percent	=	88.2 %

TABLE 53

Coop KWH: El.ht.=NO; El.h.w.=YES; A/C=window: ALL

Total 1984 KWH from Coop on Resid. Meter

Minimum	=	329
Maximum	=	24420
Range	=	24091
Sum	=	367144
Mean	=	11125.576
Median	=	10510
Mode	=	Multi-Modal
Variance	=	24577055.578
Standard deviation	=	4957.525
Standard error of the mean	=	876.375
95 Percent confidence interval around the mean	=	9407.881 - 12843.271
99 Percent confidence interval around the mean	=	8868.910 - 13382.241

* Unbiased estimates of population *

Variance	=	25345088.564
Standard deviation	=	5034.391

* Data distribution coefficients *

Skewness	=	0.379
Kurtosis	=	3.207

Kolmogorov-Smirnov statistic for normality = 5.307

Valid cases	=	33
Missing cases	=	7
Response percent	=	82.5 %

TABLE 54

Coop KWH: El.ht.=NO; El.h.w.=YES; A/C=NO: ALL

Total 1984 KWH from Coop on Resid. Meter

Minimum	=	430
Maximum	=	28020
Range	=	27590
Sum	=	223851
Mean	=	9732.652
Median	=	8823
Mode	=	Multi-Modal
Variance	=	43340410.749
Standard deviation	=	6583.343
Standard error of the mean	=	1403.574
95 Percent confidence interval around the mean	=	6981.648 - 12483.5
99 Percent confidence interval around the mean	=	6118.450 - 13346.5

* Unbiased estimates of population *

Variance	=	45310429.419
Standard deviation	=	6731.302

* Data distribution coefficients *

Skewness	=	1.083
Kurtosis	=	3.899

Kolmogorov-Smirnov statistic for normality = 4.140

Valid cases	=	23
Missing cases	=	12
Response percent	=	65.7 %

TABLE 55

Coop KWH: El.ht.=NO; El.h.w.=NO; A/C=central: ALL

Total 1984 KWH from Coop on Resid. Meter

Minimum	=	111
Maximum	=	27200
Range	=	27089
Sum	=	321888
Mean	=	10059.000
Median	=	9371.5
Mode	=	Multi-Modal
Variance	=	38570971.500
Standard deviation	=	6210.553
Standard error of the mean	=	1115.448
95 Percent confidence interval around the mean	=	7872.721 - 12245.279
99 Percent confidence interval around the mean	=	7186.721 - 12931.279

* Unbiased estimates of population *

Variance	=	39815196.387
Standard deviation	=	6309.928

* Data distribution coefficients *

Skewness	=	0.553
Kurtosis	=	3.190

Kolmogorov-Smirnov statistic for normality = 4.514

Valid cases	=	32
Missing cases	=	10
Response percent	=	76.2 %

TABLE 56

Coop KWH: El.ht.=NO; El.h.w.=NO; A/C=window: ALL

Total 1984 KWH from Coop on Resid. Meter

Minimum	=	420
Maximum	=	22369
Range	=	21949
Sum	=	283920
Mean	=	8872.500
Median	=	7301.5
Mode	=	Multi-Modal
Variance	=	38343085.813
Standard deviation	=	6192.179
Standard error of the mean	=	1112.148
95 Percent confidence interval around the mean	=	6692.689 - 11052.31
99 Percent confidence interval around the mean	=	6008.718 - 11736.32

* Unbiased estimates of population *

Variance	=	39579959.548
Standard deviation	=	6291.261

* Data distribution coefficients *

Skewness	=	0.784
Kurtosis	=	2.670

Kolmogorov-Smirnov statistic for normality = 5.443

Valid cases	=	32
Missing cases	=	11
Response percent	=	74.4 %

TABLE 57

Coop KWH: el.ht.=NO; el.h.w.=NO; A/C=NO: ALL

Total 1984 KWH from Coop on Resid. Meter

Minimum	= 429
Maximum	= 27550
Range	= 27121
Sum	= 347367
Mean	= 7719.267
Median	= 7180
Mode	= Multi-Modal
Variance	= 28024609.440
Standard deviation	= 5293.827
Standard error of the mean	= 798.074
95 Percent confidence interval around the mean	= 6155.041 - 9283.493
99 Percent confidence interval around the mean	= 5664.225 - 9774.309

* Unbiased estimates of population *

Variance	= 28661532.382
Standard deviation	= 5353.647

* Data distribution coefficients *

Skewness	= 1.483
Kurtosis	= 6.192

Kolmogorov-Smirnov statistic for normality = 5.833

Valid cases	= 45
Missing cases	= 12
Response percent	= 78.9 %

TABLE 58

Household LP usage by FARMERS

11c. 1984 LP used (Gallons).

Minimum	= 90
Maximum	= 5500
Range	= 5410
Sum	= 80484
Mean	= 1149.771
Median	= 1000
Mode	= 1000
Variance	= 739911.691
Standard deviation	= 860.181
Standard error of the mean	= 103.554
95 Percent confidence interval around the mean	= 946.806 - 1352.737
99 Percent confidence interval around the mean	= 883.121 - 1416.422

* Unbiased estimates of population *

Variance	= 750635.048
Standard deviation	= 866.392

* Data distribution coefficients *

Skewness	= 2.167
Kurtosis	= 10.553

Kolmogorov-Smirnov statistic for normality = 7.091

Valid cases	= 70
Missing cases	= 66
Response percent	= 51.5 %

TABLE 59

Amount Paid for household LP by FARMERS

11c. 1984 $ paid for LP.

Minimum	=	100
Maximum	=	3500
Range	=	3400
Sum	=	61787
Mean	=	858.153
Median	=	700
Mode	=	Multi-Modal
Variance	=	436583.241
Standard deviation	=	660.744
Standard error of the mean	=	78.416
95 Percent confidence interval around the mean	=	704.458 - 1011.8
99 Percent confidence interval around the mean	=	656.232 - 1060.(

* Unbiased estimates of population *

Variance	=	442732.300
Standard deviation	=	665.381

* Data distribution coefficients *

Skewness	=	1.585
Kurtosis	=	5.801

Kolmogorov-Smirnov statistic for normality = 6.905

Valid cases	=	72
Missing cases	=	64
Response percent	=	52.9 %

TABLE 60

Farmers who claimed one or more separate electric meters

respondent #	Number	Percent
006 =	1	3.1 %
008 =	1	3.1 %
031 =	1	3.1 %
036 =	1	3.1 %
050 =	1	3.1 %
057 =	1	3.1 %
062 =	1	3.1 %
066 =	1	3.1 %
094 =	1	3.1 %
123 =	1	3.1 %
148 =	1	3.1 %
158 =	1	3.1 %
171 =	1	3.1 %
211 =	1	3.1 %
259 =	1	3.1 %
264 =	1	3.1 %
272 =	1	3.1 %
288 =	1	3.1 %
329 =	1	3.1 %
352 =	1	3.1 %
396 =	1	3.1 %
417 =	1	3.1 %
422 =	1	3.1 %
423 =	1	3.1 %
447 =	1	3.1 %
452 =	1	3.1 %
476 =	1	3.1 %
541 =	1	3.1 %
554 =	1	3.1 %
590 =	1	3.1 %
592 =	1	3.1 %
593 =	1	3.1 %
Total	32	100.0 %

Missing cases = 0
Response percent = 100.0 %

TABLE 61

Farmers whose Coop released separate meter data

respondent #	Number	Percent
001 =	1	4.2 %
006 =	1	4.2 %
024 =	1	4.2 %
031 =	1	4.2 %
036 =	1	4.2 %
050 =	1	4.2 %
062 =	1	4.2 %
092 =	1	4.2 %
094 =	1	4.2 %
123 =	1	4.2 %
124 =	1	4.2 %
183 =	1	4.2 %
208 =	1	4.2 %
264 =	1	4.2 %
278 =	1	4.2 %
288 =	1	4.2 %
352 =	1	4.2 %
396 =	1	4.2 %
423 =	1	4.2 %
523 =	1	4.2 %
541 =	1	4.2 %
554 =	1	4.2 %
590 =	1	4.2 %
592 =	1	4.2 %
Total	24	100.0 %

Missing cases = 0
Response percent = 100.0 %

TABLE 62

Total 1984 KWH from Coop on Second Meter

Minimum	= 250
Maximum	= 25434
Range	= 25184
Sum	= 123830
Mean	= 5159.583
Median	= 2399.5
Mode	= Multi-Modal
Variance	= 40446164.660
Standard deviation	= 6359.730
Standard error of the mean	= 1326.095
95 Percent confidence interval around the mean	= 2560.436 - 7758.730
99 Percent confidence interval around the mean	= 1744.888 - 8574.279

* Unbiased estimates of population *

Variance	= 42204693.558
Standard deviation	= 6496.514

* Data distribution coefficients *

Skewness	= 1.711
Kurtosis	= 5.140

Kolmogorov-Smirnov statistic for normality = 4.215

Valid cases	= 24
Missing cases	= 112
Response percent	= 17.6 %

TABLE 63

LP use by energy-responsive farmers V21

16a. 1984 gallons LP for crop drying.

Minimum	= 100
Maximum	= 13400
Range	= 13300
Sum	= 123564
Mean	= 2574.250
Median	= 1112
Mode	= 1000
Variance	= 9379703.104
Standard deviation	= 3062.630
Standard error of the mean	= 446.731
95 Percent confidence interval around the mean	= 1698.658 - 3449.4
99 Percent confidence interval around the mean	= 1423.919 - 3724.8

* Unbiased estimates of population *

Variance	= 9579271.255
Standard deviation	= 3095.040

* Data distribution coefficients *

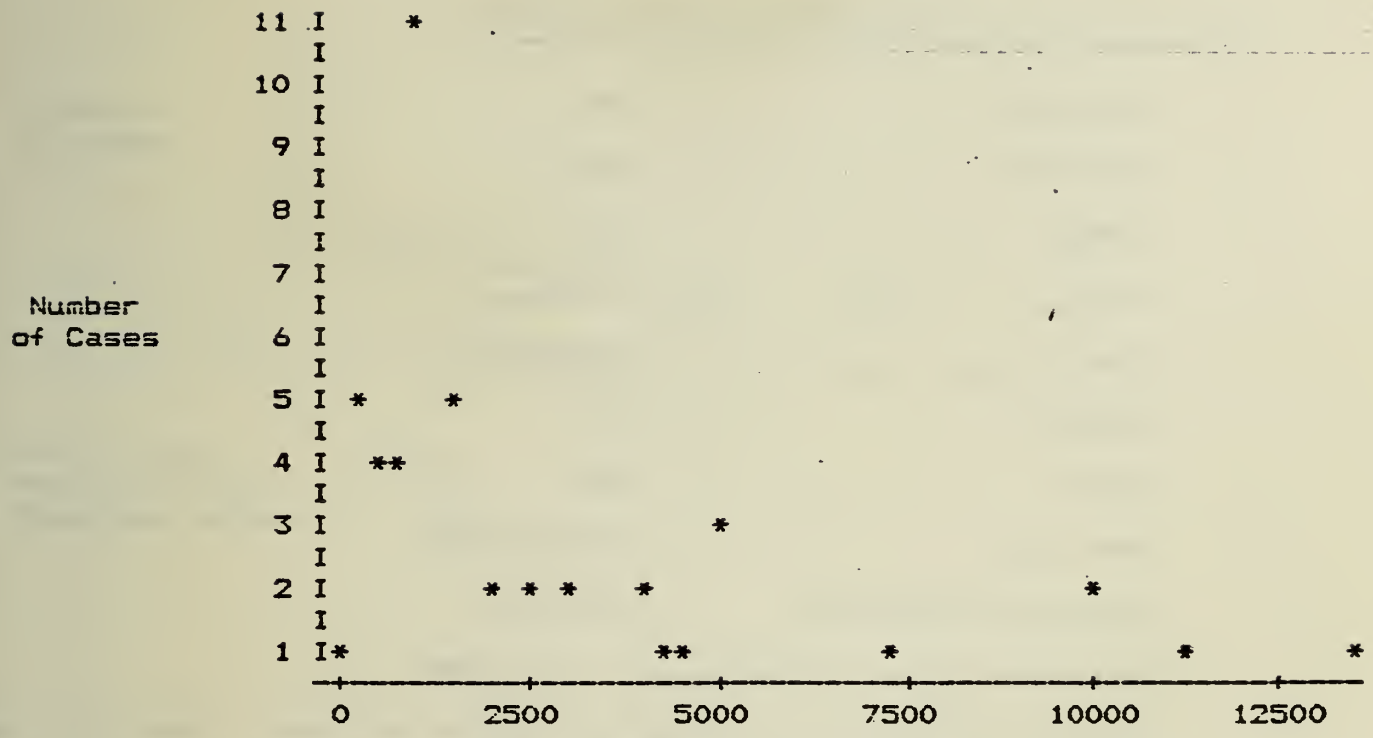
Skewness	= 1.966
Kurtosis	= 6.245

Kolmogorov-Smirnov statistic for normality = 6.107

Valid cases	= 48
Missing cases	= 69
Response percent	= 41.0 %

TABLE 64

LP use by energy-responsive farmers V21



16a. 1984 gallons LP for crop drying.

Valid cases = 48
Missing cases = 69
Response percent = 41.0 %

TABLE 65

LP use by energy-responsive farmers V22

16b. Gals.LP for heat for animal confine

Minimum	= 150
Maximum	= 4000
Range	= 3850
Sum	= 19475
Mean	= 1025.000
Median	= 625
Mode	= 600
Variance	= 927434.211
Standard deviation	= 963.034
Standard error of the mean	= 226.989
95 Percent confidence interval around the mean	= 580.101 - 1469.*
99 Percent confidence interval around the mean	= 440.503 - 1609.*

* Unbiased estimates of population *

Variance	= 979958.333
Standard deviation	= 989.423

* Data distribution coefficients *

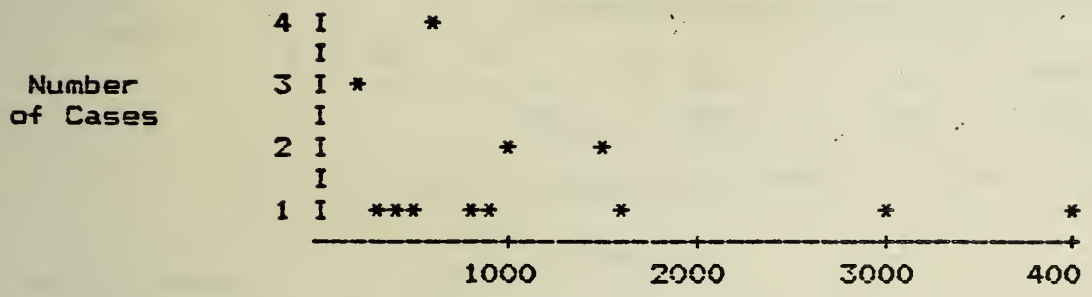
Skewness	= 1.860
Kurtosis	= 5.868

Kolmogorov-Smirnov statistic for normality = 4.300

Valid cases	= 19
Missing cases	= 98
Response percent	= 16.2 %

TABLE 66

LP use by energy-responsive farmers V22



16b. Gals.LP for heat for animal confine

Valid cases = 19
Missing cases = 98
Response percent = 16.2 %

TABLE 67

LP use by energy-responsive farmers V24

16d. Gals.LP for other farm operations.

Minimum	= 40
Maximum	= 1210
Range	= 1170
Sum	= 5505
Mean	= 393.214
Median	= 265
Mode	= 300
Variance	= 125877.168
Standard deviation	= 354.792
Standard error of the mean	= 98.402
95 Percent confidence interval around the mean	= 200.347 - 586.08
99 Percent confidence interval around the mean	= 139.830 - 646.59

* Unbiased estimates of population *

Variance	= 135560.027
Standard deviation	= 368.185

* Data distribution coefficients *

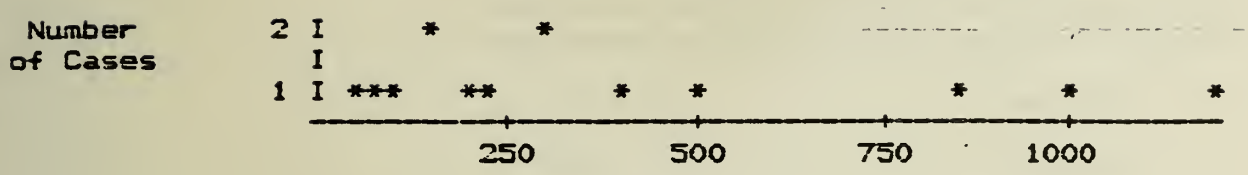
Skewness	= 1.157
Kurtosis	= 3.003

Kolmogorov-Smirnov statistic for normality = 3.068

Valid cases	= 14
Missing cases	= 103
Response percent	= 12.0 %

TABLE 68

LP use by energy-responsive farmers V24



16d. Gals.LP for other farm operations.

Valid cases	=	14
Missing cases	=	103
Response percent	=	12.0 %

TABLE 69

LP use by energy-responsive farmers V25

16e. Total 1984 gallons LP for farm use.

Minimum	= 40
Maximum	= 13400
Range	= 13360
Sum	= 147919
Mean	= 2347.921
Median	= 1050
Mode	= 1000
Variance	= 8901551.248
Standard deviation	= 2983.547
Standard error of the mean	= 378.911
95 Percent confidence interval around the mean	= 1605.255 - 3090.8
99 Percent confidence interval around the mean	= 1372.225 - 3323.1

* Unbiased estimates of population *

Variance	= 9045124.655
Standard deviation	= 3007.511

* Data distribution coefficients *

Skewness	= 2.141
Kurtosis	= 7.368

Kolmogorov-Smirnov statistic for normality = 6.717

Valid cases	= 63
Missing cases	= 54
Response percent	= 53.8 %

TABLE 70

LP use by energy-responsive farmers V25

16e. Total 1984 gallons LP for farm use.

TABLE 71

Corn acreage dried with LP only

30a. Corn - 1984 acreage.

Minimum	= 25
Maximum	= 850
Range	= 825
Sum	= 6090
Mean	= 290.000
Median	= 198
Modes (Bimodal)	= 25 & 350
Variance	= 58782.667
Standard deviation	= 242.451
Standard error of the mean	= 54.214
95 Percent confidence interval around the mean	= 183.741 - 396
99 Percent confidence interval around the mean	= 150.400 - 429

* Unbiased estimates of population *

Variance	= 61721.800
Standard deviation	= 248.439

* Data distribution coefficients *

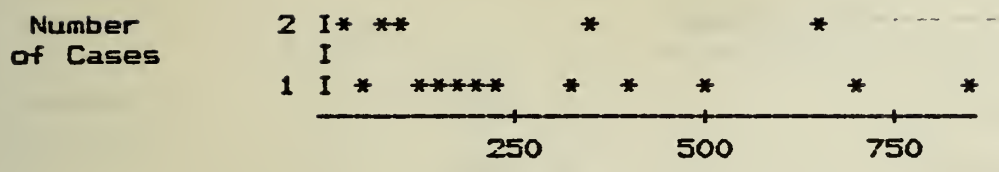
Skewness	= 0.836
Kurtosis	= 2.504

Kolmogorov-Smirnov statistic for normality = 4.255

Valid cases	= 21
Missing cases	= 1
Response percent	= 95.5 %

TABLE 72

Corn acreage dried with LP only



30a. Corn - 1984 acreage.

TABLE 73

Corn acreage dried with LP and electric heat

30a. Corn - 1984 acreage.

Minimum	= 40
Maximum	= 1000
Range	= 960
Sum	= 6739
Mean	= 259.192
Median	= 232.5
Mode	= Multi-Modal
Variance	= 44999.540
Standard deviation	= 212.131

Standard error of the mean = 42.426

95 Percent confidence interval around the mean = 176.037 - 342

99 Percent confidence interval around the mean = 149.945 - 368

* Unbiased estimates of population *

Variance	= 46799.522
Standard deviation	= 216.332

* Data distribution coefficients *

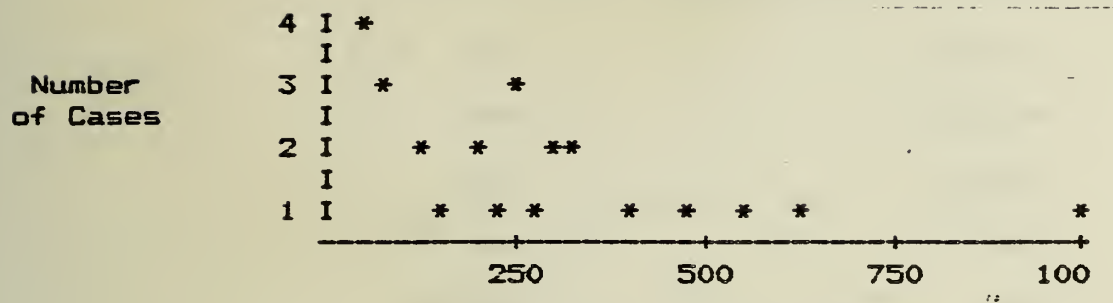
Skewness	= 1.728
Kurtosis	= 6.441

Kolmogorov-Smirnov statistic for normality = 3.988

Valid cases	= 26
Missing cases	= 0
Response percent	= 100.0 %

TABLE 74

Corn acreage dried with LP and electric heat



30a. Corn - 1984 acreage.

TABLE 75

Corn acreage dried with electric heat only

30a. Corn - 1984 acreage.

Minimum	= 100
Maximum	= 250
Range	= 150
Sum	= 550
Mean	= 137.500
Median	= 100
Mode	= 100
Variance	= 4218.750
Standard deviation	= 64.952
Standard error of the mean	= 37.500
95 Percent confidence interval around the mean	= 64.000 - 211.X
99 Percent confidence interval around the mean	= 40.937 - 234.X

* Unbiased estimates of population *

Variance	= 5625.000
Standard deviation	= 75.000

* Data distribution coefficients *

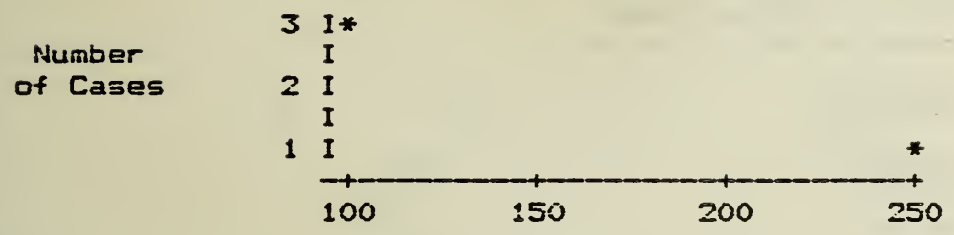
Skewness	= 1.155
Kurtosis	= 2.333

Kolmogorov-Smirnov statistic for normality = 1.734

Valid cases	= 4
Missing cases	= 0
Response percent	= 100.0 %

TABLE 76

Corn acreage dried with electric heat only



30a. Corn - 1984 acreage.

TABLE 77

Corn Acreage hired dried (by 6 farmers)

30a. Corn - 1984 acreage.

Minimum	= 8
Maximum	= 125
Range	= 117
Sum	= 464
Mean	= 77.333
Median	= 81.5
Mode	= Multi-Modal
Variance	= 1746.556
Standard deviation	= 41.792
Standard error of the mean	= 18.690
95 Percent confidence interval around the mean	= 40.701 - 113
99 Percent confidence interval around the mean	= 29.207 - 125

* Unbiased estimates of population *

Variance	= 2095.867
Standard deviation	= 45.781

* Data distribution coefficients *

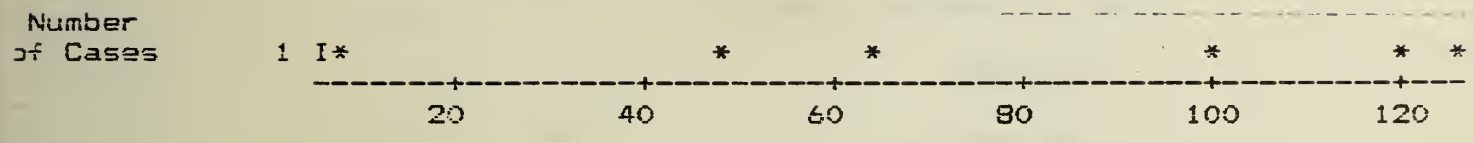
Skewness	= -0.374
Kurtosis	= 1.783

Kolmogorov-Smirnov statistic for normality = 2.358

Valid cases	= 6
Missing cases	= 0
Response percent	= 100.0 %

TABLE 78

Corn Acreage hired dried (by 6 farmers)



30a. Corn - 1984 acreage.

Valid cases = 6
Missing cases = 0
Response percent = 100.0 %

TABLE 79

Corn acreage not dried with LP, el.ht., or hired dried

30a. Corn - 1984 acreage.

Minimum	= 5
Maximum	= 400
Range	= 395
Sum	= 4724
Mean	= 96.408
Median	= 65
Modes (Bimodal)	= 20 & 200
Variance	= 8343.833
Standard deviation	= 91.345
Standard error of the mean	= 13.184
95 Percent confidence interval around the mean	= 70.567 - 12
99 Percent confidence interval around the mean	= 62.458 - 10

* Unbiased estimates of population *

Variance	= 8517.663
Standard deviation	= 92.291

* Data distribution coefficients *

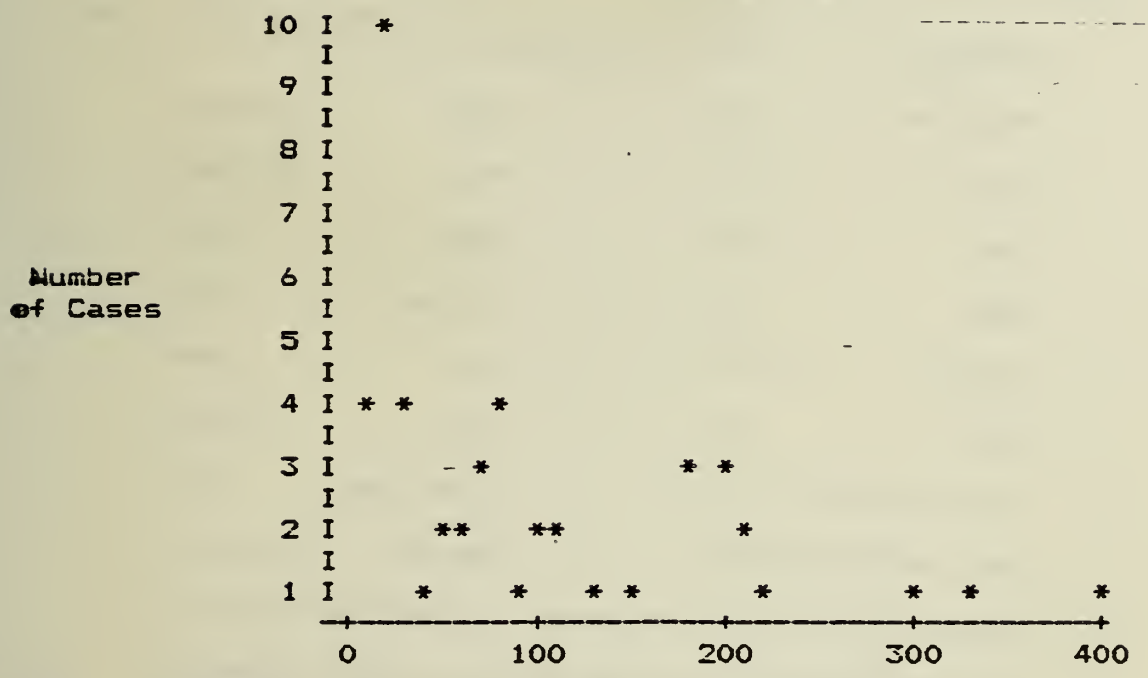
Skewness	= 1.341
Kurtosis	= 4.380

Kolmogorov-Smirnov statistic for normality = 6.818

Valid cases	= 49
Missing cases	= 10
Response percent	= 83.1 %

TABLE 80

Corn acreage not dried with LP, el.ht., or hired dried



30a. Corn - 1984 acreage.

TABLE 81

1984 Corn Acreage reported by energy-responsive farmers

30a. Corn - 1984 acreage.

Minimum	= 5
Maximum	= 1000
Range	= 995
Sum	= 18567
Mean	= 175.160
Median	= 104
Mode	= 100
Variance	= 34605.286
Standard deviation	= 186.025
Standard error of the mean	= 18.154
95 Percent confidence interval around the mean	= 139.578 - 210
99 Percent confidence interval around the mean	= 128.413 - 221

* Unbiased estimates of population *

Variance	= 34934.860
Standard deviation	= 186.909

* Data distribution coefficients *

Skewness	= 2.003
Kurtosis	= 7.482

Kolmogorov-Smirnov statistic for normality = 8.899

Valid cases	= 106
Missing cases	= 11
Response percent	= 90.6 %

TABLE 82

LP to dry corn where LP only was used

16a. 1984 gallons LP for crop drying.

Minimum	=	160
Maximum	=	13400
Range	=	13240
Sum	=	64610
Mean	=	3076.667
Median	=	1500
Mode	=	Multi-Modal
Variance	=	13233317.460
Standard deviation	=	3637.763
Standard error of the mean	=	813.428
95 Percent confidence interval around the mean	=	1482.347 - 4
99 Percent confidence interval around the mean	=	982.088 - 51

* Unbiased estimates of population *

Variance	=	13894983.333
Standard deviation	=	3727.598

* Data distribution coefficients *

Skewness	=	1.605
Kurtosis	=	4.455

Kolmogorov-Smirnov statistic for normality = 4.169

Valid cases	=	21
Missing cases	=	55
Response percent	=	27.6 %

TABLE 83

LP to dry corn where LP and electric heat were used to dry

16a. 1984 gallons LP for crop drying.

Minimum	= 100
Maximum	= 11200
Range	= 11100
Sum	= 55854
Mean	= 2148.231
Median	= 1025
Mode	= 1000
Variance	= 6231922.870
Standard deviation	= 2496.382
Standard error of the mean	= 499.276
95 Percent confidence interval around the mean	= 1169.649 - 3126.813
99 Percent confidence interval around the mean	= 862.594 - 3433.868

* Unbiased estimates of population *

Variance	= 6481199.785
Standard deviation	= 2545.820

* Data distribution coefficients *

Skewness	= 2.165
Kurtosis	= 7.549

Kolmogorov-Smirnov statistic for normality = 4.173

Valid cases	= 26
Missing cases	= 4
Response percent	= 86.7 %

TABLE 84

Diesel Use by energy-responsive Farmers : V30

17e. Total 1984 gallons diesel for farm.

Minimum	=	200
Maximum	=	15000
Range	=	14800
Sum	=	246934
Mean	=	3165.821
Median	=	2000
Mode	=	2000
Variance	=	9572194.583
Standard deviation	=	3093.896
Standard error of the mean	=	352.582
95 Percent confidence interval around the mean	=	2474.759 - 3856.882
99 Percent confidence interval around the mean	=	2257.921 - 4073.720

* Unbiased estimates of population *

Variance	=	9696508.799
Standard deviation	=	3113.922

* Data distribution coefficients *

Skewness	=	1.997
Kurtosis	=	7.083

Kolmogorov-Smirnov statistic for normality = 7.431

Valid cases	=	78
Missing cases	=	39
Response percent	=	66.7 %

TABLE 85

Gasoline Use by energy-responsive Farmers: V35

17e. Total 1984 gals.gasoline for farm.

Minimum	= 13
Maximum	= 8700
Range	= 8687
Sum	= 170713
Mean	= 1816.096
Median	= 1500
Mode	= 1000
Variance	= 3026060.087
Standard deviation	= 1739.557
Standard error of the mean	= 180.384
95 Percent confidence interval around the mean	= 1462.544 - 2169.[illegible]
99 Percent confidence interval around the mean	= 1351.608 - 2280.[illegible]

* Unbiased estimates of population *

Variance	= 3058598.367
Standard deviation	= 1748.885

* Data distribution coefficients *

Skewness	= 1.818
Kurtosis	= 6.505

Kolmogorov-Smirnov statistic for normality = 8.095

Valid cases	= 94
Missing cases	= 23
Response percent	= 80.3 %

TABLE 86

18a. Type alt. energy for water heating.	Number	Percent
1 = solar	1	50.0 %
2 = wind	0	0.0 %
3 = biomass	0	0.0 %
4 = wood	1	50.0 %
Total	2	100.0 %

Missing cases = 134
Response percent = 1.5 %

TABLE 87

18b. Type alt.energy for air heating.	Number	Percent
1 = solar	0	0.0 %
2 = wind	0	0.0 %
3 = biomass	0	0.0 %
4 = wood	6	100.0 %
Total	6	100.0 %

Missing cases = 130
Response percent = 4.4 %

TABLE 88

18b. % of air heating need by alt.energy	Number	Percent
010 =	1	16.7 %
020 =	1	16.7 %
050 =	1	16.7 %
090 =	1	16.7 %
095 =	1	16.7 %
100 =	1	16.7 %
Total	6	100.0 %

Missing cases = 130
Response percent = 4.4 %

TABLE 89

Fertilizer Use by energy-responsive farmers

19a. Lbs. of nitrogen fertilizer in 1984

Minimum	= 100
Maximum	= 140250
Range	= 140150
Sum	= 2727713
Mean	= 27552.657
Median	= 15000
Mode	= 30000
Variance	= 1105727572.064
Standard deviation	= 33252.482
Standard error of the mean	= 3359.008
95 Percent confidence interval around the mean	= 20969.001 - 34136.312
99 Percent confidence interval around the mean	= 18903.211 - 36202.102

* Unbiased estimates of population *

Variance	= 1117010506.473
Standard deviation	= 33421.707

* Data distribution coefficients *

Skewness	= 1.904
Kurtosis	= 6.093

Kolmogorov-Smirnov statistic for normality = 9.815

Valid cases	= 99
Missing cases	= 17
Response percent	= 85.3 %

TABLE 90

Fertilizer Use by energy-responsive farmers

19b. Lbs. of P2O5 fertilizer in 1984.

Minimum	=	50
Maximum	=	185500
Range	=	185450
Sum	=	1815841
Mean	=	19737.402
Median	=	9607.5
Mode	=	12000
Variance	=	852555662.501
Standard deviation	=	29198.556
Standard error of the mean	=	3060.840
95 Percent confidence interval around the mean	=	13738.155 - 25736
99 Percent confidence interval around the mean	=	11855.739 - 27619

* Unbiased estimates of population *

Variance	=	861924406.045
Standard deviation	=	29358.549

* Data distribution coefficients *

Skewness	=	3.161
Kurtosis	=	15.413

Kolmogorov-Smirnov statistic for normality = 8.010

Valid cases	=	92
Missing cases	=	24
Response percent	=	79.3 %

TABLE 91

Fertilizer Use by energy-responsive farmers

19c. Lbs. of K2O fertilizer in 1984.

Minimum	=	0
Maximum	=	280000
Range	=	280000
Sum	=	2456126
Mean	=	26139.000
Median	=	13045
Mode	=	24000
Variance	=	1434790621.638
Standard deviation	=	37878.630
Standard error of the mean	=	3927.831
95 Percent confidence interval around the mean	=	18430.451 - 33827.5
99 Percent confidence interval around the mean	=	16014.835 - 36243.1

* Unbiased estimates of population *

Variance	=	1450218477.785
Standard deviation	=	38081.734

* Data distribution coefficients *

Skewness	=	3.978
Kurtosis	=	24.178

Kolmogorov-Smirnov statistic for normality = 8.359

Valid cases	=	94
Missing cases	=	22
Response percent	=	81.0 %

TABLE 92

DRAFT, 9/10/76

UNITED STATES

ENERGY AND AGRICULTURE, 1974 DATA BASE. FERTILIZER SUMMARY BY STATE

STATE	VALUE OF PROD ($1000)	ACRES (1000)A/	YIELD PER ACRE HVSTD N/A	NITROGEN POUNDS (1000)	PHOSPHATE (P205) LBS (1000)	POTASH (K20) LBS (1000)	BTU'S INV ENERGY (BILLION)B/	BTU'S PER ACRE (1000)
ALABAMA	616209	3527	N/A	183964	161120	142513	7227	2049
ALASKA	3505	17	N/A	414	1639	570	24	1463
ARIZONA	649730	1400	N/A	165350	38429	8853	5394	3852
ARKANSAS	1430974	7855	N/A	306335	134371	199869	11130	1417
CALIFORNIA	5149698	9124	N/A	813807	363002	87300	27703	3036
COLORADO	978827	6152	N/A	174649	97726	31958	6112	993
CONNECTICUT	73405	164	N/A	11975	9604	8151	461	2818
DELAWARE	112961	585	N/A	26967	39529	38458	1223	2092
FLORIDA	1648349	2437	N/A	258878	293893	362325	11236	4611
GEORGIA	1279323	5576	N/A	317118	269958	270538	12521	2246
HAWAII	488506	294	N/A	52944	22835	25407	1482	6415
IDAHO	1153322	4526	N/A	253826	173106	80371	9200	2033
ILLINOIS	5149067	22910	N/A	1363179	927812	1052233	52057	2272
INDIANA	2556626	12445	N/A	806341	656379	844250	32340	2599
IOWA	5569308	24202	N/A	1334128	756706	674511	48586	2007
KANSAS	2617599	21706	N/A	901747	407332	130816	30869	1422
KENTUCKY	1306641	4844	N/A	290543	247066	202747	11277	2328
LOUISIANA	1201215	4087	N/A	198354	139476	101552	7379	1806
MAINE	166401	463	N/A	29433	23639	13613	1105	2387
MARYLAND	366011	1618	N/A	78496	88719	91819	3327	2056
MASSACHUSETTS	48491	184	N/A	14282	8847	6942	523	2843
MICHIGAN	1346594	6660	N/A	341717	300737	291429	13547	2034
MINNESOTA	3332335	20801	N/A	957894	635572	576465	35792	1721
MISSISSIPPI	916509	5744	N/A	299862	69770	55284	9950	1732
MISSOURI	1864337	13588	N/A	741030	359586	325688	26439	1946
MONTANA	929653	9429	N/A	266216	381625	2771	10413	1104
NEBRASKA	2800628	17910	N/A	1289231	419778	106255	42884	2394
NEVADA	66481	522	N/A	7835	26321	2589	401	768
NEW HAMPSHIRE	23203	114	N/A	8685	3998	2749	304	2679
NEW JERSEY	178873	623	N/A	42079	39457	29390	1654	2656
NEW MEXICO	169870	1192	N/A	55122	21849	3202	1849	1551
NEW YORK	823049	4461	N/A	241208	212526	181202	9459	2120
NORTH CAROLINA	1792307	5121	N/A	342142	323806	297129	13713	2678
NORTH DAKOTA	1813247	19934	N/A	315251	361654	59102	12068	605
OHIO	2206634	10945	N/A	571062	537235	527811	23006	2102
OKLAHOMA	928033	11050	N/A	489695	373603	71718	17614	1594
OREGON	727235	3367	N/A	164243	105923	53174	5924	1760
PENNSYLVANIA	878776	4679	N/A	256854	207547	167239	9858	2107
RHODE ISLAND	6259	18	N/A	1883	2701	1727	81	4654
SOUTH CAROLINA	649465	3116	N/A	138763	155178	148345	5813	1866
SOUTH DAKOTA	1206949	16135	N/A	198200	149758	16872	7069	438
TENNESSEE	753939	4824	N/A	257421	213484	182168	9972	2067
TEXAS	2673746	23694	N/A	1156850	612805	128677	39936	1685
UTAH	212005	1220	N/A	39241	17552	4451	1337	1096
VERMONT	76627	578	N/A	37973	17953	12835	1336	2311
VIRGINIA	696657	3178	N/A	221220	158550	131180	8323	2619
WASHINGTON	1326606	5432	N/A	323219	161219	68188	11240	2069
WEST VIRGINIA	141455	823	N/A	55923	27552	16815	1964	2386
WISCONSIN	1663249	9620	N/A	379535	334136	420059	15459	1607
WYOMING	211870	1799	N/A	65044	26562	6975	2200	1223
UNITED STATES	62055185	340596	N/A	16848122	11119596	8266327	621181	1824

NOTES: PRELIMINARY DATA DEVELOPED BY THE ECONOMIC RESEARCH SERVICE, U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D.C. 20250, UNDER A JOINTLY FUNDED COOPERATIVE AGREEMENT WITH THE FEDERAL ENERGY ADMINISTRATION. NUMBERS MAY NOT ADD UP EXACTLY DUE TO ROUNDING. (A: HARVESTED ACREAGE EXCEPT FOR PLANTED ACREAGE IN THE FOLLOWING: RICE, RYE, WINTER WHEAT, OATS, BARLEY, COTTON, SOYBEANS, PEANUTS, FLAXSEED, DRY EDIBLE BEANS, DRY EDIBLE PEAS, SUGAR BEETS, SWEET POTATOES. (B: INVESTED ENERGY INCLUDES THE ENERGY REQUIRED TO MANUFACTURE AND TRANSPORT FERTILIZERS. DASH INDICATES LESS THAN ONE-HALF UNIT.

UNITED STATES

ENERGY AND AGRICULTURE, 1974 DATA BASE. PESTICIDE SUMMARY BY STATE

STATE	VALUE OF PROD ($1000)A/	ACRES (1000)B/	YIELD PER ACRE HVSTD N/A	HERBICIDE POUNDS (1000)	INSECTICIDE POUNDS (1000)	FUNGICIDE POUNDS (1000)	OTHERS POUNDS (1000)	BTU'S INV ENER (BILL)C/	BTU'S PER ACRE (1000)
ALABAMA	616209	3527	N/A	4211.2	17360.3	978.3	1209.3	3020.4	856
ALASKA	3506	17	N/A	10.1	6.6	0.1	-	1.7	99
ARIZONA	649730	1401	N/A	2576.6	7274.2	2076.2	677.7	1563.2	1116
ARKANSAS	1430974	7855	N/A	21367.5	24981.9	2407.4	1687.4	5399.2	687
CALIFORNIA	5149698	9124	N/A	9431.1	19146.5	29633.6	2459.7	5976.2	655
COLORADO	978827	6153	N/A	2504.2	940.7	776.4	134.5	469.8	76
CONNECTICUT	73406	164	N/A	237.5	144.1	205.6	41.1	61.6	375
DELAWARE	112901	585	N/A	609.1	195.2	46.7	6.8	96.2	164
FLORIDA	1648349	2437	N/A	2189.7	18825.8	5685.0	1503.4	3628.4	1489
GEORGIA	1279323	5576	N/A	5240.6	17256.1	5089.3	2006.3	3795.9	681
HAWAII	488507	294	N/A	856.5	594.6	-	-	161.1	548
IDAHO	1153322	4527	N/A	2636.5	1169.4	1350.2	978.5	665.5	147
ILLINOIS	5149067	22910	N/A	26495.8	5279.7	229.4	1.2	3550.9	155
INDIANA	2556626	12445	N/A	14983.4	2839.9	128.3	50.8	2081.8	167
IOWA	5569308	24202	N/A	28859.5	5620.7	30.6	-	3908.4	161
KANSAS	2617600	21707	N/A	10389.3	1799.9	72.4	-	1299.0	60
KENTUCKY	1306641	4844	N/A	3354.9	520.4	46.7	1312.7	601.2	124
LOUISIANA	1201215	4087	N/A	13228.8	17642.6	83.5	910.0	3747.7	917
MAINE	166402	464	N/A	1434.9	586.9	382.9	143.5	225.5	486
MARYLAND	366011	1619	N/A	1537.0	348.5	394.0	206.6	281.4	174
MASSACHUSETTS	48491	185	N/A	124.0	205.0	435.0	4.1	59.1	320
MICHIGAN	1346594	6660	N/A	7662.3	4366.7	3014.6	25.2	1567.8	235
MINNESOTA	3332335	20802	N/A	21545.7	2691.5	340.5	-	2657.1	128
MISSISSIPPI	916509	5744	N/A	20850.1	35996.2	609.0	2499.5	7290.0	1269
MISSOURI	1864337	13588	N/A	10685.8	9760.4	233.5	574.5	2585.1	190
MONTANA	929654	9429	N/A	2685.1	135.6	33.4	20.3	165.5	18
NEBRASKA	2800628	17910	N/A	13980.2	3347.5	43.9	-	2009.2	112
NEVADA	66481	522	N/A	49.2	56.8	35.7	27.0	20.5	39
NEW HAMPSHIRE	23204	114	N/A	54.0	76.4	205.5	0.7	25.0	219
NEW JERSEY	178874	623	N/A	490.4	576.6	1469.6	9.0	291.0	467
NEW MEXICO	169870	1193	N/A	1569.9	2475.3	713.1	234.1	618.9	519
NEW YORK	823049	4462	N/A	2616.8	1862.8	4004.1	53.8	720.2	161
NORTH CAROLINA	1792307	5121	N/A	7354.8	9206.2	4921.6	8208.0	3703.0	723
NORTH DAKOTA	1813247	19935	N/A	8946.7	816.0	613.2	-	648.5	33
OHIO	2206634	10945	N/A	10783.4	2959.0	703.2	65.2	1646.6	150
OKLAHOMA	928033	11051	N/A	5611.8	8365.8	2851.6	844.2	2169.3	196
OREGON	727236	3367	N/A	1265.8	924.1	44.2	24.2	210.0	62
PENNSYLVANIA	878776	4679	N/A	3288.4	1009.5	2561.2	142.8	702.0	150
RHODE ISLAND	6260	18	N/A	69.1	21.6	-	6.0	9.5	522
SOUTH CAROLINA	649465	3117	N/A	1963.0	12146.0	2259.4	1580.6	2289.1	735
SOUTH DAKOTA	1206949	16136	N/A	9258.9	1646.1	61.6	-	1107.7	69
TENNESSEE	753939	4824	N/A	5182.6	3885.9	71.7	1447.9	1271.1	263
TEXAS	2673746	23695	N/A	47673.3	79170.7	82931.2	8106.1	19653.4	829
UTAH	212005	1221	N/A	302.1	286.5	186.5	21.5	81.7	67
VERMONT	76628	579	N/A	223.2	121.5	190.9	1.0	50.4	87
VIRGINIA	696657	3179	N/A	3056.7	1591.6	2469.4	1405.3	940.9	296
WASHINGTON	1326607	5432	N/A	3300.6	4098.6	786.8	472.5	894.6	165
WEST VIRGINIA	141455	824	N/A	227.9	250.6	869.7	14.5	110.6	134
WISCONSIN	1663249	9620	N/A	7455.2	2535.2	296.4	68.1	1175.9	122
WYOMING	211870	1799	N/A	453.7	74.4	32.5	18.8	61.6	34
UNITED STATES	62055185	340596	N/A	350880.6	332693.8	102604.9	39204.3	95269.6	280

NOTES: PRELIMINARY DATA DEVELOPED BY THE ECONOMIC RESEARCH SERVICE, U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D.C. 20250, UNDER A JOINTLY FUNDED COOPERATIVE AGREEMENT WITH THE FEDERAL ENERGY ADMINISTRATION. (A) CROPS LISTED IN ORDER OF VALUE OF PRODUCTION, 1974 PRICES. (B) HARVESTED ACREAGE EXCEPT FOR PLANTED ACREAGE IN THE FOLLOWING: RICE, RYE, WINTER WHEAT, OATS, BARLEY, COTTON, SOYBEANS, PEANUTS, FLAXSEED, DRY EDIBLE BEANS, DRY EDIBLE PEAS, SUGAR BEETS, AND SWEET POTATOES. (C) INVESTED ENERGY INCLUDES THE ENERGY REQUIRED TO MANUFACTURE AND TRANSPORT THE PESTICIDES (INCLUDING CARRIER SOLUTION). NUMBERS MAY NOT ADD UP EXACTLY TO TOTALS DUE TO ROUNDING. DASH INDICATES LESS THAN ONE-HALF UNIT.

TABLE 94

27a. Tons solid manure produced.

Minimum	= 3
Maximum	= 5000
Range	= 4997
Sum	= 12318
Mean	= 324.158
Median	= 100
Mode	= 100
Variance	= 637696.238
Standard deviation	= 798.559
Standard error of the mean	= 131.282
95 Percent confidence interval around the mean	= 66.845 - 581.471
99 Percent confidence interval around the mean	= -13.894 - 662.210

* Unbiased estimates of population *

Variance	= 654931.272
Standard deviation	= 809.278

* Data distribution coefficients *

Skewness	= 5.282
Kurtosis	= 30.957

Kolmogorov-Smirnov statistic for normality = 4.021

Valid cases	= 38
Missing cases	= 97
Response percent	= 28.1 %

TABLE 95

27a. Tons solid manure used as fertilizer

Minimum	= 3
Maximum	= 5000
Range	= 4997
Sum	= 11291
Mean	= 297.132
Median	= 100
Mode	= 100
Variance	= 642315.009
Standard deviation	= 801.446
Standard error of the mean	= 131.757
95 Percent confidence interval around the mean	= 38.888 - 555.375
99 Percent confidence interval around the mean	= -42.142 - 636.405

* Unbiased estimates of population *

Variance	= 659674.874
Standard deviation	= 812.204

* Data distribution coefficients *

Skewness	= 5.322
Kurtosis	= 31.226

Kolmogorov-Smirnov statistic for normality = 3.938

Valid cases	= 38
Missing cases	= 97
Response percent	= 28.1 %

TABLE 96

27b. Gals.liquid manure produced.

Minimum	=	2500
Maximum	=	400000
Range	=	397500
Sum	=	1332000
Mean	=	148000.000
Median	=	100000
Mode	=	Multi-Modal
Variance	=	14638388888.889
Standard deviation	=	120989.210
Standard error of the mean	=	42776.146
95 Percent confidence interval around the mean	=	64158.752 - 23184
99 Percent confidence interval around the mean	=	37851.422 - 25814

* Unbiased estimates of population *

Variance	=	16468187500.000
Standard deviation	=	128328.436

* Data distribution coefficients *

Skewness	=	0.706
Kurtosis	=	2.599

Kolmogorov-Smirnov statistic for normality = 3.212

Valid cases	=	9
Missing cases	=	126
Response percent	=	6.7 %

TABLE 97

27b. Gals.liq.manure used as fertilizer.

Minimum	=	2500
Maximum	=	400000
Range	=	397500
Sum	=	1432000
Mean	=	143200.000
Median	=	100000
Mode	=	100000
Variance	=	13381910000.000
Standard deviation	=	115680.206
Standard error of the mean	=	38560.069
95 Percent confidence interval around the mean	=	67622.264 - 218777.7
99 Percent confidence interval around the mean	=	43907.822 - 242492.1

* Unbiased estimates of population *

Variance	=	14868788888.889
Standard deviation	=	121937.643

* Data distribution coefficients *

Skewness	=	0.844
Kurtosis	=	2.932

Kolmogorov-Smirnov statistic for normality = 3.376

Valid cases	=	10
Missing cases	=	125
Response percent	=	7.4 %

TABLE 98

DRAFT, 9/10/76

UNITED STATES

ENERGY AND AGRICULTURE, 1974 DATA BASE. FERTILIZER SUMMARY BY COMMODITY

CROPS	VALUE OF PROD ($1000)	ACRES (1000) A/	YIELD PER ACRE HARVESTED	NITROGEN POUNDS (1000)	PHOSPHATE (P2O5) LBS (1000)	POTASH (K2O) LBS (1000)	BTU'S INV ENERGY (BILLION) B/	BTU'S PER ACRE (1000)
CORN	16328085	65194	71.3 BU	6627499	3587970	3576778	241373	3702
SOYBEANS	9480088	53582	23.5 BU	221233	847917	1041127	16051	300
WINTER WHEAT	5656984	52407	29.5 BU	2021972	1230181	561507	72126	1376
ALFALFA	3653791	26642	2.8 TONS	94385	543845	294906	7221	271
CORN SILAGE	2695718	10695	10.4 TONS	956702	535692	511919	34923	3265
COTTON	2587493	13731	443.0 LBS	999058	450596	257241	34677	2525
GRAIN SORGHUM	1917599	13917	45.1 BU	981778	385254	122275	33199	2385
VEGETABLES-FRESH	1857584	1552	N/A	204608	293047	132951	8562	5518
SPRING WHEAT	1856698	18762	21.8 BU	432614	419950	40288	15962	851
HAY-OTHER	1817131	33904	1.6 TONS	1546265	386556	86475	50608	1493
POTATOES	1538216	1381	12.3 TONS	407869	312666	236173	15434	11176
RICE	1230199	2588	4441.0 LBS	267908	198533	85920	9804	3788
SUGAR BEETS	1035567	1252	18.3 TONS	174473	129302	25713	6255	4998
OATS	1025599	18136	46.6 BU	324423	317899	191522	12677	699
FLUE-CURED TOBACCO	990604	617	2017.1 LBS	46252	123480	92590	2521	4088
SUGAR CANE	923600	865	34.5 TONS	83006	120662	121984	3774	4365
VEGETABLES-PROCESS	922299	1773	N/A	261330	459403	198969	11533	6504
BARLEY	890999	9153	37.2 BU	317202	215691	43201	11249	1229
BURLEY TOBACCO	797030	340	2203.4 LBS	84950	155723	122797	4033	11880
NONCITRUS-OTHER	668063	919	N/A	135924	768	792	4235	4607
PEANUTS	664500	1523	2491.0 LBS	27902	70715	61347	1523	1001
ORANGES	611583	881	8.5 TONS	152995	36129	148411	5594	6351
GRAPES	602769	573	5.4 TONS	31496	6604	25557	1126	1964
APPLES	520232	456	8.0 TONS	77349	-	16660	2477	5434
EDIBLE BEANS-DRIED	452800	1636	1325.0 LBS	65440	93718	98536	2978	1820
PEACHES	258864	231	6.5 TONS	23958	-	-	745	3231
SEED CROPS	163216	1431	N/A	11506	40726	17686	660	461
SORGHUM SILAGE	162979	746	9.7 TONS	57907	20256	4451	1933	2591
GRAPEFRUIT	153258	175	13.0 TONS	31176	6839	27958	1127	6449
FLAXSEED	135300	1787	8.1 BU	6530	12998	131	276	154
LEMONS	109025	63	11.5 TONS	12221	1451	2970	401	6414
SWEET POTATOES	106800	124	5.9 TONS	16068	16993	22333	690	5581
SHADE TOBACCO	58910	7	1885.0 LBS	1255	2162	1127	56	8464
CITRUS-OTHER	51103	80	N/A	14382	4818	15067	539	6740
RYE	49300	3200	21.5 BU	91839	73136	66241	3546	1108
PINEAPPLES	41100	57	24700.0 LBS	5700	3265	3433	210	3686
EDIBLE PEAS-DRIED	40100	220	1515.0 LBS	-	-	-	-	N/A
UNSPECIFIED CROPS	N/A	N/A	N/A	30948	14654	9290	1084	N/A
TOTAL-CROPS	62055185	340596	N/A	16848122	11119596	8266327	621181	1824

NOTES: PRELIMINARY DATA DEVELOPED BY THE ECONOMIC RESEARCH SERVICE, U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D.C. 20250, UNDER A JOINTLY FUNDED COOPERATIVE AGREEMENT WITH THE FEDERAL ENERGY ADMINISTRATION. NUMBERS MAY NOT ADD UP EXACTLY DUE TO ROUNDING. (A) HARVESTED ACREAGE EXCEPT FOR PLANTED ACREAGE IN THE FOLLOWING: RICE, RYE, WINTER WHEAT, OATS, BARLEY, COTTON, SOYBEANS, PEANUTS, FLAXSEED, DRY EDIBLE BEANS, DRY EDIBLE PEAS, SUGAR BEETS, SWEET POTATOES. (B) INVESTED ENERGY INCLUDES THE ENERGY REQUIRED TO MANUFACTURE AND TRANSPORT FERTILIZERS TO THE FARM GATE. DASH INDICATES LESS THAN ONE-HALF UNIT.

TABLE 99

7a. Heating practices -DESCRIPTION	Number	Percent
0 = add electric	3	1.9 %
1 = lowered thermst	27	16.8 %
2 = wood heat	72	44.7 %
3 = replace furnace	27	16.8 %
4 = solar	2	1.2 %
5 = insul/repair	9	5.6 %
6 = gas/kero sp.htr.	6	3.7 %
7 = heat pump	2	1.2 %
8 = no description	6	3.7 %
9 = Other:APPENDIX B	7	4.3 %
Total	161	100.0 %

Missing cases = 192
Response percent = 45.6 %

TABLE 100

cooling practices--DESCRIPTION.	Number	Percent
0 = new A/C	13	14.0 %
1 = raised thermstat	5	5.4 %
2 = rare use of A/C	26	28.0 %
4 = fans	18	19.4 %
5 = central A/C	16	17.2 %
6 = insulation	3	3.2 %
8 = no description	4	4.3 %
9 = Other:APPENDIX C	8	8.6 %
Total	93	100.0 %

Missing cases = 260
Response percent = 26.3 %

TABLE 101

7c. Other appliance usage-DESCRIPTION	Number	Percent
1 = stopped use	9	17.0 %
2 = use energy effic	5	9.4 %
3 = added appliance	22	41.5 %
5 = el. to gas h.w.	5	9.4 %
6 = el. to gas appl	2	3.8 %
7 = gas to el.appl	1	1.9 %
8 = no description	2	3.8 %
9 = Other:APPENDIX D	7	13.2 %
Total	53	100.0 %

Missing cases = 300
Response percent = 15.0 %

TABLE 102

7d. Weatherstrip/caulking: DESCRIPTION.	Number	Percent
1 = weatherstripped	4	3.6 %
2 = caulked	14	12.6 %
3 = both ws & caulk	35	31.5 %
4 = added insulation	17	15.3 %
5 = added storm door	2	1.8 %
6 = storm windows	6	5.4 %
7 = storm drs & wind	4	3.6 %
8 = no description	29	26.1 %
9 = Other:APPENDIX E	0	0.0 %
Total	111	100.0 %

Missing cases = 242
Response percent = 31.4 %

TABLE 103

7e. "Other" DESCRIPTION of change.	Number	Percent
2 = insul/repairs	12	17.6 %
3 = storms	10	14.7 %
4 = insul & storms	3	4.4 %
5 = siding & storms	2	2.9 %
6 = siding only	13	19.1 %
7 = siding & insul	4	5.9 %
8 = no description	1	1.5 %
9 = Other:APPENDIX F	23	33.8 %
Total	68	100.0 %

Missing cases = 285
Response percent = 19.3 %

TABLE 104

Frequency Distribution for Variable 72 - ALL RESPONDENTS

Heating practice change--YEARS	Number	Percent
1 = before 75	8	4.9 %
2 = 75/76	10	6.2 %
3 = 77/78	23	14.2 %
4 = 79/80	31	19.1 %
5 = 81/82	35	21.6 %
6 = 83/84	40	24.7 %
7 = 85	3	1.9 %
8 = no date	12	7.4 %
Total	162	100.0 %

Missing cases = 191
Response percent = 45.9 %

TABLE 105

Frequency Distribution for Variable 72 - FARMERS ONLY

Heating practice change--YEARS	Number	Percent
1 = before 75	3	4.3 %
2 = 75/76	2	2.9 %
3 = 77/78	9	12.9 %
4 = 79/80	17	24.3 %
5 = 81/82	15	21.4 %
6 = 83/84	18	25.7 %
7 = 85	0	0.0 %
8 = no date	6	8.6 %
Total	70	100.0 %

Missing cases = 66
Response percent = 51.5 %

TABLE 106

Frequency Distribution for Variable 75 - ALL RESPONDENTS

Cooling practice change-YEARS	Number	Percent
1 = before 75	3	3.2 %
2 = 75/76	4	4.3 %
3 = 77/78	13	13.8 %
4 = 79/80	14	14.9 %
5 = 81/82	14	14.9 %
6 = 83/84	30	31.9 %
7 = 85	6	6.4 %
8 = no date	10	10.6 %
Total	94	100.0 %

Missing cases = 259
Response percent = 26.6 %

TABLE 107

Frequency Distribution for Variable 75 - FARMERS ONLY

Cooling practice change-YEARS	Number	Percent
1 = before 75	1	2.8 %
2 = 75/76	2	5.6 %
3 = 77/78	5	13.9 %
4 = 79/80	6	16.7 %
5 = 81/82	4	11.1 %
6 = 83/84	10	27.8 %
7 = 85	4	11.1 %
8 = no date	4	11.1 %
Total	36	100.0 %

Missing cases = 100
Response percent = 26.5 %

TABLE 108

Frequency Distribution for Variable 78 - ALL RESPONDENTS

Appliance usage change-YEARS	Number	Percent
1 = before 75	1	1.9 %
2 = 75/76	2	3.8 %
3 = 77/78	5	9.4 %
4 = 79/80	2	3.8 %
5 = 81/82	15	28.3 %
6 = 83/84	17	32.1 %
7 = 85	3	5.7 %
8 = no date	8	15.1 %
Total	53	100.0 %

Missing cases = 300
Response percent = 15.0 %

TABLE 109

Frequency Distribution for Variable 78 - FARMERS ONLY

Appliance usage change-YEARS	Number	Percent
1 = before 75	0	0.0 %
2 = 75/76	0	0.0 %
3 = 77/78	3	15.0 %
4 = 79/80	1	5.0 %
5 = 81/82	7	35.0 %
6 = 83/84	7	35.0 %
7 = 85	0	0.0 %
8 = no date	2	10.0 %
Total	20	100.0 %

Missing cases = 116
Response percent = 14.7 %

TABLE 110

Frequency Distribution for Variable 81 - ALL RESPONDENTS

Weatherization/caulking-YEARS	Number	Percent
1 = before 75	4	3.5 %
2 = 75/76	5	4.3 %
3 = 77/78	6	5.2 %
4 = 79/80	20	17.4 %
5 = 81/82	20	17.4 %
6 = 83/84	37	32.2 %
7 = 85	4	3.5 %
8 = no date	19	16.5 %
Total	115	100.0 %

Missing cases = 238
Response percent = 32.6 %

TABLE 111

Frequency Distribution for Variable 81 - FARMERS ONLY

Weatherization/caulking-YEARS	Number	Percent
1 = before 75	2	4.3 %
2 = 75/76	3	6.5 %
3 = 77/78	0	0.0 %
4 = 79/80	9	19.6 %
5 = 81/82	9	19.6 %
6 = 83/84	15	32.6 %
7 = 85	0	0.0 %
8 = no date	8	17.4 %
Total	46	100.0 %

Missing cases = 90
Response percent = 33.8 %

TABLE 112

Frequency Distribution for Variable 84 - ALL RESPONDENTS

Other change-YEARS	Number	Percent
1 = before 75	2	3.0 %
2 = 75/76	6	9.0 %
3 = 77/78	4	6.0 %
4 = 79/80	12	17.9 %
5 = 81/82	15	22.4 %
6 = 83/84	14	20.9 %
7 = 85	5	7.5 %
8 = no date	9	13.4 %
Total	67	100.0 %

Missing cases = 286
Response percent = 19.0 %

TABLE 113

Frequency Distribution for Variable 84 - FARMERS ONLY

Other change-YEARS	Number	Percent
1 = before 75	0	0.0 %
2 = 75/76	2	7.4 %
3 = 77/78	2	7.4 %
4 = 79/80	7	25.9 %
5 = 81/82	6	22.2 %
6 = 83/84	4	14.8 %
7 = 85	0	0.0 %
8 = no date	6	22.2 %
Total	27	100.0 %

Missing cases = 109
Response percent = 19.9 %

TABLE 114

Frequency Distribution for Variable 66 - ALL RESPONDENTS

10a. Change in heating fuel - NEW FUEL	Number	Percent
1 = electricity	5	7.1 %
2 = oil	0	0.0 %
3 = LP	8	11.4 %
4 = NG	15	21.4 %
5 = wood	41	58.6 %
6 = kerosene	1	1.4 %
9 = other	0	0.0 %
Total	70	100.0 %

Missing cases = 283
Response percent = 19.8 %

TABLE 115

Frequency Distribution for Variable 66 - FARMERS ONLY

10a. Change in heating fuel - NEW FUEL	Number	Percent
1 = electricity	0	0.0 %
2 = oil	0	0.0 %
3 = LP	4	12.5 %
4 = NG	6	18.8 %
5 = wood	22	68.8 %
6 = kerosene	0	0.0 %
9 = other	0	0.0 %
Total	32	100.0 %

Missing cases = 104
Response percent = 23.5 %

TABLE 116

Frequency Distribution for Variable 65 - ALL RESPONDENTS

10a. Change in heating fuel - OLD FUEL	Number	Percent
1 = electricity	7	10.1 %
2 = oil	26	37.7 %
3 = LP	27	39.1 %
4 = NG	5	7.2 %
5 = wood	2	2.9 %
6 = kerosene	0	0.0 %
7 = coal	2	2.9 %
9 = other	0	0.0 %
Total	69	100.0 %

Missing cases = 284
Response percent = 19.5 %

TABLE 117

Frequency Distribution for Variable 65 - FARMERS ONLY

10a. Change in heating fuel - OLD FUEL	Number	Percent
1 = electricity	2	6.5 %
2 = oil	12	38.7 %
3 = LP	12	38.7 %
4 = NG	2	6.5 %
5 = wood	1	3.2 %
6 = kerosene	0	0.0 %
7 = coal	2	6.5 %
9 = other	0	0.0 %
Total	31	100.0 %

Missing cases = 105
Response percent = 22.8 %

TABLE 118

CHANGES IN PRIMARY HEATING FUEL: OLD vs. NEW FUEL (N = 353)

10a. Change in heating fuel - OLD FUEL	10a. Change in heating fuel - NEW FUEL				
	electricit	LP	NG	wood	keros
electricity	0 0.0	0 0.0	2 28.6	5 71.4	0 0.0
oil	3 11.5	6 23.1	7 26.9	10 38.5	0 0.0
LP	1 3.7	0 0.0	5 18.5	20 74.1	1 3.7
NG	1 20.0	0 0.0	0 0.0	4 80.0	0 0.0
wood	0 0.0	1 50.0	1 50.0	0 0.0	0 0.0
coal	0 0.0	1 50.0	0 0.0	1 50.0	0 0.0

TABLE 119

CHANGES IN PRIMARY HEATING FUEL: NEW FUEL vs. YEARS OF CHANGE (N=

	Change of heating fuel-YEARS						
	befor 75	75/76	77/78	79/80	81/82	83/84	85
10a. Change in heating fuel - NEW FUEL							
electricity	1	2	1	0	1	0	0
LP	0	1	2	2	2	1	0
NG	0	2	0	3	5	5	0
wood	0	3	6	12	6	12	2

TABLE 120

CHANGES IN PRIMARY HEATING FUEL: OLD FUEL vs. YEARS OF CHANGE (N = 3

	Change of heating fuel-YEARS						
	befor 75	75/76	77/78	79/80	81/82	83/84	85
10a. Change in heating fuel - OLD FUEL							
electricity	0	0	1	1	2	3	0
oil	1	4	5	7	5	4	0
LP	0	2	3	6	7	8	0
NG	0	2	0	1	0	0	2
wood	0	0	0	1	0	1	0
coal	0	0	0	1	0	1	0

TABLE 121

Change of heating fuel-YEARS	Number	Percent
1 = before 75	1	1.4 %
2 = 75/76	8	11.6 %
3 = 77/78	9	13.0 %
4 = 79/80	17	24.6 %
5 = 81/82	14	20.3 %
6 = 83/84	18	26.1 %
7 = 85	2	2.9 %
Total	69	100.0 %

Missing cases = 284
Response percent = 19.5 %

TABLE 122

10b. Change in hot water fuel - OLD FUEL	Number	Percent
1 = electric	20	69.0 %
2 = oil	1	3.4 %
3 = LP	6	20.7 %
4 = natural gas	1	3.4 %
5 = wood	0	0.0 %
6 = kerosene	0	0.0 %
7 = no heater	1	3.4 %
9 = other	0	0.0 %
Total	29	100.0 %

Missing cases = 324
Response percent = 8.2 %

TABLE 123

10b. Change in hot water fuel - NEW FUEL	Number	Percent
1 = electric	3	10.3 %
2 = oil	1	3.4 %
3 = LP	13	44.8 %
4 = natural gas	8	27.6 %
5 = wood	4	13.8 %
6 = kerosene	0	0.0 %
9 = other	0	0.0 %
Total	29	100.0 %

Missing cases = 324
Response percent = 8.2 %

TABLE 124

Hot water fuel change-YEARS	Number	Percent
1 = before 75	0	0.0 %
2 = 75/76	2	6.5 %
3 = 77/78	5	16.1 %
4 = 79/80	5	16.1 %
5 = 81/82	3	9.7 %
6 = 83/84	11	35.5 %
7 = 85	5	16.1 %
Total	31	100.0 %

Missing cases = 322
Response percent = 8.8 %

TABLE 125

CHANGE IN WATER HEATING FUEL: OLD vs. NEW FUEL (N = 353)

10b. Change in hot water fuel - OLD FUEL	10b. Change in hot water fuel - NEW FUEL				
	elect	oil	LP	natur gas	wood
electric	0 0.0	0 0.0	13 65.0	6 30.0	1 5.0
oil	1 100.0	0 0.0	0 0.0	0 0.0	0 0.0
LP	1 16.7	1 16.7	0 0.0	1 16.7	3 50.0
natural gas	1 100.0	0 0.0	0 0.0	0 0.0	0 0.0
no heater	0 0.0	0 0.0	0 0.0	1 100.0	0 0.0

TABLE 126

COOLING CHANGES vs. AIR CONDITIONING TYPE (N = 353)

7b. Cooling practices--DESCRIPTION.	6. What type air conditioning in home? no A/C	centr A/C	windo A/C
new A/C	0 0.0	2 4.1	10 33.3
raised thermstat	0 0.0	5 10.2	0 0.0
rare use of A/C	2 15.4	13 26.5	11 36.7
fans	9 69.2	4 8.2	5 16.7
central A/C	0 0.0	16 32.7	0 0.0
insulation	0 0.0	1 2.0	2 6.7
no description	1 7.7	2 4.1	1 3.3
Other:APPENDIX C	1 7.7	6 12.2	1 3.3

TABLE 127

Frequency Distribution of Number of Persons in Household

Number of Persons in Household	Percentage All Households	Percentage Households Fuel Change
One	13.4	7.1
Two	39.0	20.0
Three	19.3	27.1
Four	17.0	30.6
Five	7.1	10.6
Six	2.1	2.4
Seven	1.2	1.2
More than seven	0.9	1.2
	100.0	100.0

TABLE 128

Frequency Distribution of Households by Age of Adults

Average Age of Household Adults	Percentage All Households	Percentage Households Fuel Change
18 to 24	4.2	2.4
25 to 34	23.3	33.0
35 to 44	21.5	34.3
45 to 54	12.3	14.2
55 to 64	14.9	7.1
65 and over	23.9	9.5
	100.0	100.0

TABLE 129

Frequency Distribution for Variable 11 - FARMERS ONLY

Number of Persons in Household	Number	Percent
01 =	11	8.4 %
02 =	53	40.5 %
03 =	21	16.0 %
04 =	25	19.1 %
05 =	14	10.7 %
06 =	3	2.3 %
07 =	3	2.3 %
08 =	1	0.8 %
Total	131	100.0 %

Missing cases = 5
Response percent = 96.3 %

TABLE 130

Frequency Distribution for Variable 11 - NON-FARMERS ONLY

Number of Persons in Household	Number	Percent
01 =	34	16.6 %
02 =	78	38.0 %
03 =	44	21.5 %
04 =	32	15.6 %
05 =	10	4.9 %
06 =	4	2.0 %
07 =	1	0.5 %
08 =	1	0.5 %
10 =	1	0.5 %
Total	205	100.0 %

Missing cases = 12
Response percent = 94.5 %

TABLE 131

Frequency Distribution for Variable 27 - FARMERS ONLY

2. When was your home built?	Number	Percent
1 = before 1940	84	61.8 %
2 = 1940-59	19	14.0 %
3 = 1960-74	11	8.1 %
4 = 1975-79	15	11.0 %
5 = 1980 or since	7	5.1 %
Total	136	100.0 %

Missing cases = 0
Response percent = 100.0 %

TABLE 132

Frequency Distribution for Variable 27 - NON-FARMERS ONLY

2. When was your home built?	Number	Percent
1 = before 1940	93	43.1 %
2 = 1940-59	34	15.7 %
3 = 1960-74	50	23.1 %
4 = 1975-79	18	8.3 %
5 = 1980 or since	21	9.7 %
Total	216	100.0 %

Missing cases = 1
Response percent = 99.5 %

TABLE 133

Frequency Distribution for Variable 28 - FARMERS ONLY

3. How many rooms do you have in home?	Number	Percent
04 =	9	6.9 %
05 =	25	19.1 %
06 =	26	19.8 %
07 =	27	20.6 %
08 =	24	18.3 %
09 =	11	8.4 %
10 =	3	2.3 %
11 =	3	2.3 %
12 =	1	0.8 %
13 =	2	1.5 %
Total	131	100.0 %

Missing cases = 5
Response percent = 96.3 %

TABLE 134

Frequency Distribution for Variable 28 - NON-FARMERS ONLY

3. How many rooms do you have in home?	Number	Percent
01 =	4	1.9 %
02 =	3	1.4 %
03 =	5	2.4 %
04 =	24	11.3 %
05 =	45	21.2 %
06 =	53	25.0 %
07 =	32	15.1 %
08 =	21	9.9 %
09 =	9	4.2 %
10 =	7	3.3 %
11 =	3	1.4 %
12 =	4	1.9 %
15 =	1	0.5 %
18 =	1	0.5 %
Total	212	100.0 %

Missing cases = 5
Response percent = 97.7 %

TABLE 135

Frequency Distribution for Variable 37 - FARMERS ONLY

Primary Fuel	Number	Percent
1 = electric	11	8.3 %
2 = gas	74	56.1 %
3 = oil	17	12.9 %
4 = wood	28	21.2 %
5 = fp w/o insert	0	0.0 %
6 = kerosene	1	0.8 %
7 = other	1	0.8 %
Total	132	100.0 %

Missing cases = 4
Response percent = 97.1 %

TABLE 136

Frequency Distribution for Variable 37 - NON-FARMERS ONLY

Primary Fuel	Number	Percent
1 = electric	27	12.7 %
2 = gas	122	57.5 %
3 = oil	19	9.0 %
4 = wood	38	17.9 %
5 = fp w/o insert	0	0.0 %
6 = kerosene	1	0.5 %
7 = other	5	2.4 %
Total	212	100.0 %

Missing cases = 5
Response percent = 97.7 %

TABLE 137

Frequency Distribution for Variable 66 - FARMERS ONLY

10a. Change in heating fuel - NEW FUEL	Number	Percent
1 = electricity	0	0.0 %
2 = oil	0	0.0 %
3 = LP	4	12.5 %
4 = NG	6	18.8 %
5 = wood	22	68.8 %
6 = kerosene	0	0.0 %
9 = other	0	0.0 %
Total	32	100.0 %

Missing cases = 104
Response percent = 23.5 %

TABLE 138

Frequency Distribution for Variable 66 - NON-FARMERS ONLY

10a. Change in heating fuel - NEW FUEL	Number	Percent
1 = electricity	5	13.2 %
2 = oil	0	0.0 %
3 = LP	4	10.5 %
4 = NG	9	23.7 %
5 = wood	19	50.0 %
6 = kerosene	1	2.6 %
9 = other	0	0.0 %
Total	38	100.0 %

Missing cases = 179
Response percent = 17.5 %

TABLE 139

Frequency Distribution for Variable 60 - FARMERS ONLY

9. What fuel for hot water heater?	Number	Percent
1 = electricity	68	54.4 %
2 = oil	2	1.6 %
3 = LP or NG	54	43.2 %
5 = no heater	0	0.0 %
9 = Other:APPENDIX I	1	0.8 %
Total	125	100.0 %

Missing cases = 11
Response percent = 91.9 %

TABLE 140

Frequency Distribution for Variable 60 - NON-FARMERS ONLY

9. What fuel for hot water heater?	Number	Percent
1 = electricity	103	49.3 %
2 = oil	0	0.0 %
3 = LP or NG	104	49.8 %
5 = no heater	2	1.0 %
9 = Other:APPENDIX I	0	0.0 %
Total	209	100.0 %

Missing cases = 8
Response percent = 96.3 %

TABLE 141

Frequency Distribution for Variable 69 - FARMERS ONLY

10b. Change in hot water fuel - OLD FUEL	Number	Percent
1 = electric	14	87.5 %
2 = oil	0	0.0 %
3 = LP	1	6.3 %
4 = natural gas	0	0.0 %
5 = wood	0	0.0 %
6 = kerosene	0	0.0 %
7 = no heater	1	6.3 %
9 = other	0	0.0 %
Total	16	100.0 %

Missing cases = 120
Response percent = 11.8 %

TABLE 142

Frequency Distribution for Variable 69 - NON-FARMERS ONLY

10b. Change in hot water fuel - OLD FUEL	Number	Percent
1 = electric	6	46.2 %
2 = oil	1	7.7 %
3 = LP	5	38.5 %
4 = natural gas	1	7.7 %
5 = wood	0	0.0 %
6 = kerosene	0	0.0 %
7 = no heater	0	0.0 %
9 = other	0	0.0 %
Total	13	100.0 %

Missing cases = 204
Response percent = 6.0 %

TABLE 143

Frequency Distribution for Variable 70 - FARMERS ONLY

10b. Change in hot water fuel - NEW FUEL	Number	Percent
1 = electric	0	0.0 %
2 = oil	1	6.3 %
3 = LP	9	56.3 %
4 = natural gas	5	31.3 %
5 = wood	1	6.3 %
6 = kerosene	0	0.0 %
9 = other	0	0.0 %
Total	16	100.0 %

Missing cases = 120
Response percent = 11.8 %

TABLE 144

Frequency Distribution for Variable 70 - NON-FARMERS ONLY

10b. Change in hot water fuel - NEW FUEL	Number	Percent
1 = electric	3	23.1 %
2 = oil	0	0.0 %
3 = LP	4	30.8 %
4 = natural gas	3	23.1 %
5 = wood	3	23.1 %
6 = kerosene	0	0.0 %
9 = other	0	0.0 %
Total	13	100.0 %

Missing cases = 204
Response percent = 6.0 %

TABLE 145

Frequency Distribution for Variable 64 - FARMERS ONLY

Change of heating fuel-YEARS	Number	Percent
1 = before 75	0	0.0 %
2 = 75/76	4	12.5 %
3 = 77/78	2	6.3 %
4 = 79/80	10	31.3 %
5 = 81/82	6	18.8 %
6 = 83/84	9	28.1 %
7 = 85	1	3.1 %
Total	32	100.0 %

Missing cases = 104
Response percent = 23.5 %

TABLE 146

Frequency Distribution for Variable 64 - NON-FARMERS ONLY

Change of heating fuel-YEARS	Number	Percent
1 = before 75	1	2.7 %
2 = 75/76	4	10.8 %
3 = 77/78	7	18.9 %
4 = 79/80	7	18.9 %
5 = 81/82	8	21.6 %
6 = 83/84	9	24.3 %
7 = 85	1	2.7 %
Total	37	100.0 %

Missing cases = 180
Response percent = 17.1 %

TABLE 147

Frequency Distribution for Variable 68 - FARMERS ONLY

Hot water fuel change-YEARS	Number	Percent
1 = before 75	0	0.0 %
2 = 75/76	0	0.0 %
3 = 77/78	3	17.6 %
4 = 79/80	3	17.6 %
5 = 81/82	1	5.9 %
6 = 83/84	6	35.3 %
7 = 85	4	23.5 %
Total	17	100.0 %

Missing cases = 119
Response percent = 12.5 %

TABLE 148

Frequency Distribution for Variable 68 - NON-FARMERS ONLY

Hot water fuel change-YEARS	Number	Percent
1 = before 75	0	0.0 %
2 = 75/76	2	14.3 %
3 = 77/78	2	14.3 %
4 = 79/80	2	14.3 %
5 = 81/82	2	14.3 %
6 = 83/84	5	35.7 %
7 = 85	1	7.1 %
Total	14	100.0 %

Missing cases = 203
Response percent = 6.5 %

TABLE 149

Descriptive Statistics for Variable 11 - ALL RESPONDENTS

Number of Persons in Household

Minimum	= 1
Maximum	= 10
Range	= 9
Sum	= 946
Mean	= 2.815
Median	= 2
Mode	= 2
Variance	= 2.020
Standard deviation	= 1.421
Standard error of the mean	= 0.078
95 Percent confidence interval around the mean	= 2.663 - 2.968
99 Percent confidence interval around the mean	= 2.616 - 3.015

* Unbiased estimates of population *

Variance	= 2.026
Standard deviation	= 1.423

* Data distribution coefficients *

Skewness	= 1.217
Kurtosis	= 5.299

Kolmogorov-Smirnov statistic for normality = 16.187

Valid cases	= 336
Missing cases	= 17
Response percent	= 95.2 %

TABLE 150

Descriptive Statistics for Variable 11 - ALL RESPONDE

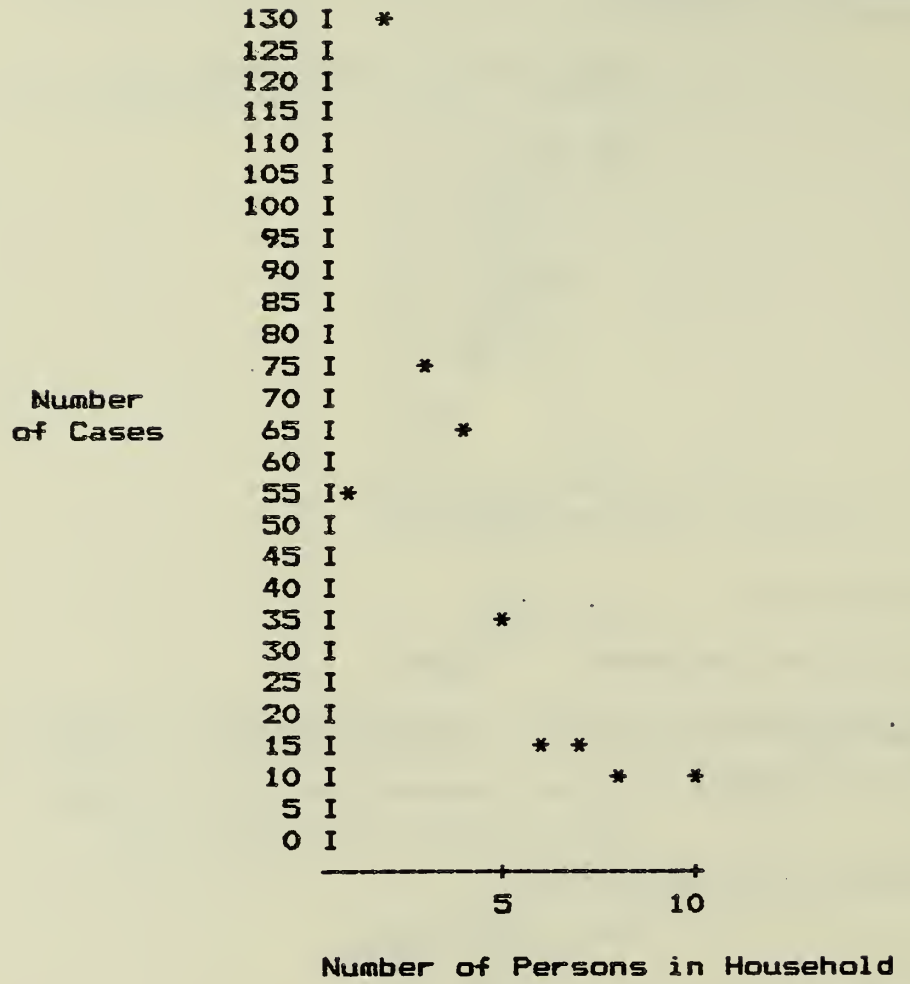


TABLE 151

Descriptive Statistics for Variable 11 - FARMERS ONLY

Number of Persons in Household

Minimum	= 1
Maximum	= 8
Range	= 7
Sum	= 397
Mean	= 3.031
Median	= 3
Mode	= 2
Variance	= 2.121
Standard deviation	= 1.456
Standard error of the mean	= 0.128
95 Percent confidence interval around the mean	= 2.780 - 3.281
99 Percent confidence interval around the mean	= 2.702 - 3.359

* Unbiased estimates of population *

Variance	= 2.138
Standard deviation	= 1.462

* Data distribution coefficients *

Skewness	= 0.911
Kurtosis	= 3.507

Kolmogorov-Smirnov statistic for normality = 9.705

Valid cases	= 131
Missing cases	= 5
Response percent	= 96.3 %

TABLE 152

Descriptive Statistics for Variable 11 - FARMERS ONLY

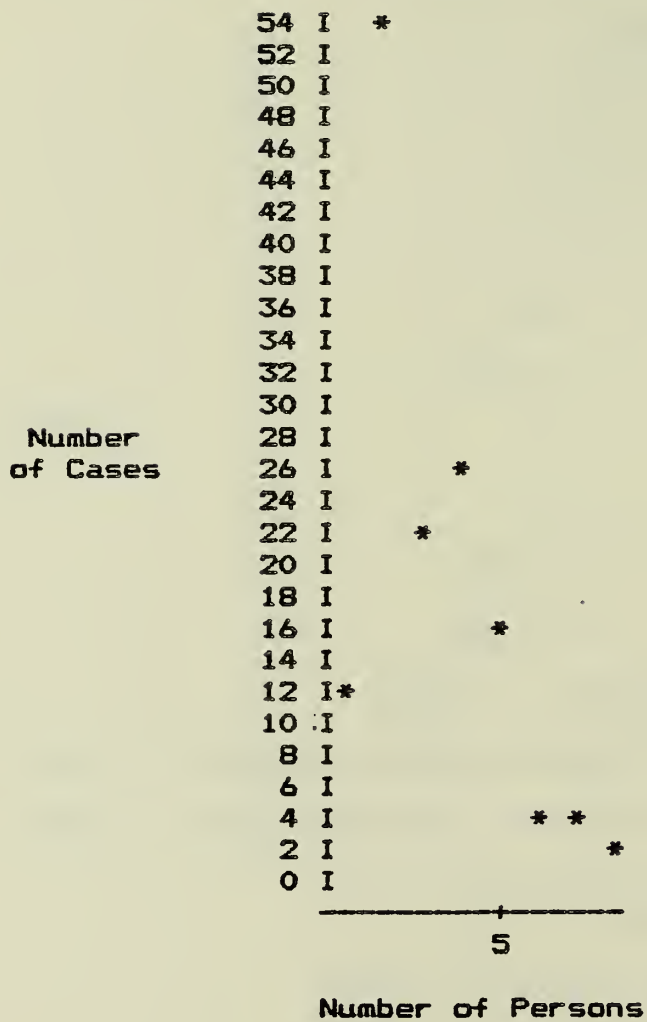


TABLE 153 -

Reliance on Farm Income	Number	Percent
1 = Farm Income only	55	41.4 %
2 = F-T Farm + job	18	13.5 %
3 = P-T Farm + job	44	33.1 %
4 = retired P-T Farm	16	12.0 %
Total	133	100.0 %

Missing cases = 3
Response percent = 97.8 %

TABLE 154

Type of Production	Number	Percent
1 = grain only	32	27.1 %
2 = grain+livestock	86	72.9 %
Total	118	100.0 %

Missing cases = 18
Response percent = 86.8 %

TABLE 155

FULL-TIME or PART-TIME FARMING vs. TYPE OF PRODUCTION (N = 136)

	Type of Production	
	grain only	grain+livestock
Reliance on Farm Income		
Farm Income only	11 20.0 34.4	44 80.0 51.2
F-T Farm + job	4 22.2 12.5	14 77.8 16.3
P-T Farm + job	17 38.6 53.1	27 61.4 31.4
retired F-T Farm	0 0.0 0.0	1 100.0 1.2

TABLE 156

TOTAL ACREAGE OF FULL-TIME FARMERS

Total 1984 Acreage Planted-excl. pasture

Minimum	= 32
Maximum	= 1700
Range	= 1668
Sum	= 25743
Mean	= 384.224
Median	= 280
Mode	= 80
Variance	= 102787.368
Standard deviation	= 320.605
Standard error of the mean	= 39.464
95 Percent confidence interval around the mean	= 306.875 - 461.573
99 Percent confidence interval around the mean	= 282.605 - 485.843

* Unbiased estimates of population *

Variance	= 104344.752
Standard deviation	= 323.024

* Data distribution coefficients *

Skewness	= 1.713
Kurtosis	= 6.471

Kolmogorov-Smirnov statistic for normality = 6.673

Valid cases	= 67
Missing cases	= 6
Response percent	= 91.8 %

TABLE 157

TOTAL ACREAGE OF FULL-TIME FARMERS

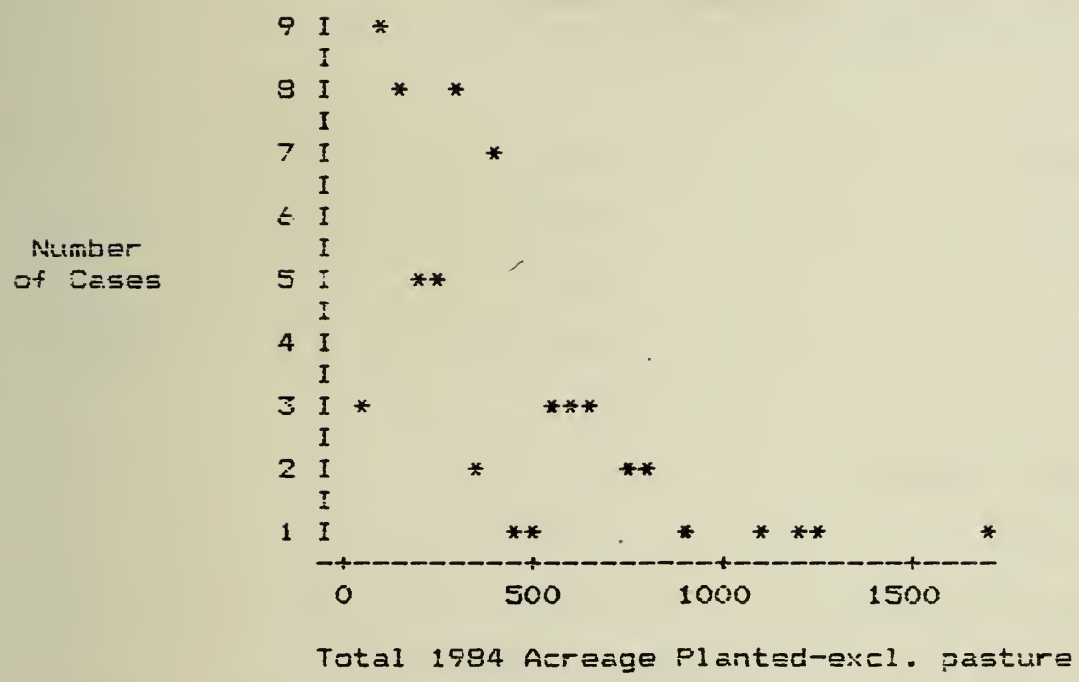


TABLE 158

TOTAL ACREAGE OF PART-TIME FARMERS

Total 1984 Acreage Planted-excl. pasture

Minimum	= 5
Maximum	= 1368
Range	= 1363
Sum	= 9335
Mean	= 194.479
Median	= 77.5
Modes (Bimodal)	= 15 & 50
Variance	= 76681.166
Standard deviation	= 276.914
Standard error of the mean	= 40.392
95 Percent confidence interval around the mean	= 115.311 - 273.64
99 Percent confidence interval around the mean	= 90.470 - 298.48

* Unbiased estimates of population *

Variance	= 78312.680
Standard deviation	= 279.844

* Data distribution coefficients *

Skewness	= 2.534
Kurtosis	= 9.716

Kolmogorov-Smirnov statistic for normality = 5.070

Valid cases	= 48
Missing cases	= 12
Response percent	= 80.0 %

TABLE 159

TOTAL ACREAGE OF PART-TIME FARMERS

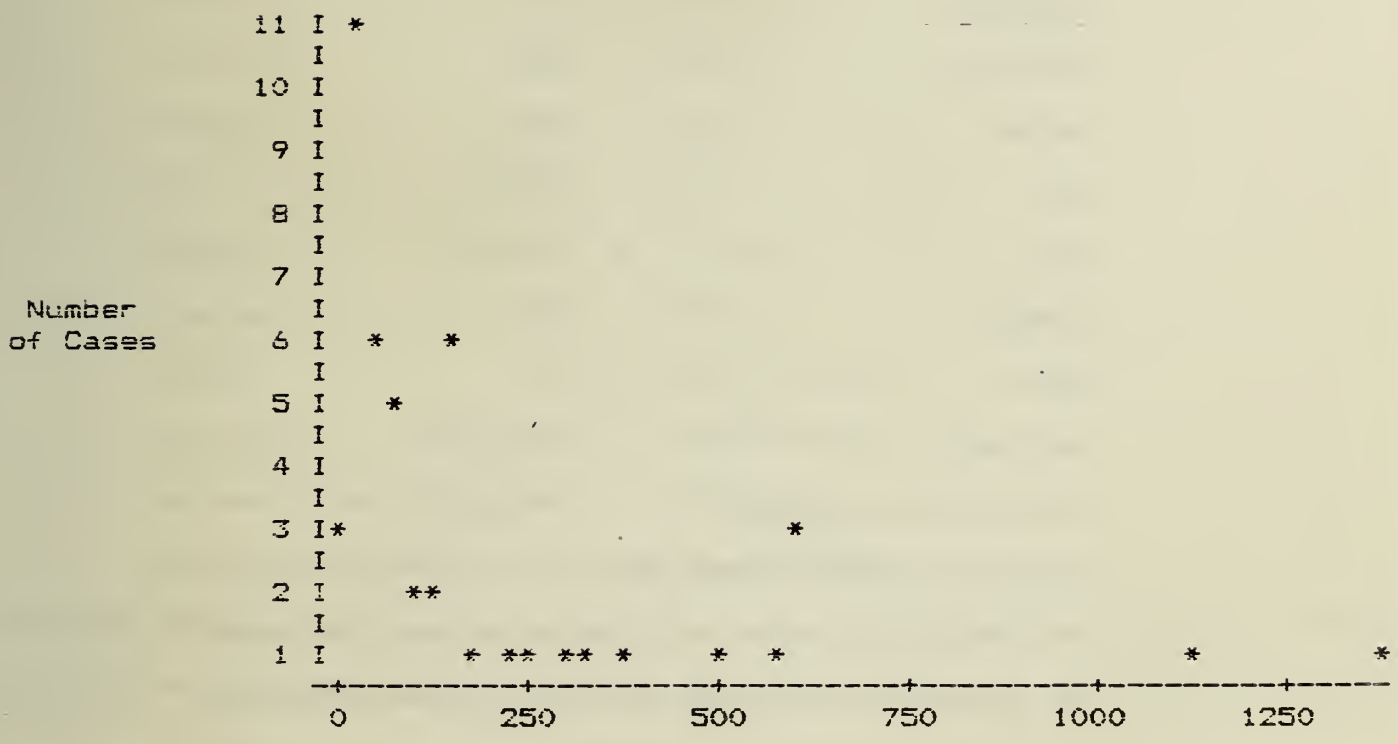


TABLE 160

Total Acreage of F-T Farmers with no outside income

Total 1984 Acreage Planted-excl. pasture

Minimum	= 32
Maximum	= 1260
Range	= 1228
Sum	= 18297
Mean	= 373.408
Median	= 275
Mode	= 80
Variance	= 89808.201
Standard deviation	= 299.680
Standard error of the mean	= 43.255
95 Percent confidence interval around the mean	= 288.628 - 458
99 Percent confidence interval around the mean	= 262.026 - 484

* Unbiased estimates of population *

Variance	= 91679.205
Standard deviation	= 302.786

* Data distribution coefficients *

Skewness	= 1.273
Kurtosis	= 4.040

Kolmogorov-Smirnov statistic for normality = 5.076

Valid cases	= 49
Missing cases	= 6
Response percent	= 89.1 %

TABLE 161

Total Acreage of F-T Farmers with outside job of spouse

Total 1984 Acreage Planted-excl. pasture

Minimum	= 56
Maximum	= 1700
Range	= 1644
Sum	= 7446
Mean	= 413.667
Median	= 327.5
Mode	= Multi-Modal
Variance	= 136934.222
Standard deviation	= 370.046
Standard error of the mean	= 89.749
95 Percent confidence interval around the mean	= 237.758 - 589.57
99 Percent confidence interval around the mean	= 182.562 - 644.77

* Unbiased estimates of population *

Variance	= 144989.176
Standard deviation	= 380.774

* Data distribution coefficients *

Skewness	= 2.223
Kurtosis	= 8.301

Kolmogorov-Smirnov statistic for normality = 3.693

Valid cases	= 18
Missing cases	= 0
Response percent	= 100.0 %

TABLE 162

Total Acreage of P-T Farmers

Total 1984 Acreage Planted-excl. pasture

Minimum	= 5
Maximum	= 1114
Range	= 1109
Sum	= 6358
Mean	= 176.611
Median	= 73.5
Mode	= 15
Variance	= 56765.404
Standard deviation	= 238.255
Standard error of the mean	= 40.272
95 Percent confidence interval around the mean	= 97.677 - 255.54
99 Percent confidence interval around the mean	= 72.910 - 280.31

* Unbiased estimates of population *

Variance	= 58387.273
Standard deviation	= 241.635

* Data distribution coefficients *

Skewness	= 2.187
Kurtosis	= 7.816

Kolmogorov-Smirnov statistic for normality = 4.878

Valid cases	= 36
Missing cases	= 8
Response percent	= 81.8 %

TABLE 163

Total Acreage of Retired Farmers

Total 1984 Acreage Planted-excl. pasture

Minimum	= 20
Maximum	= 1368
Range	= 1348
Sum	= 2977
Mean	= 248.083
Median	= 108
Mode	= Multi-Modal
Variance	= 132597.243
Standard deviation	= 364.139
Standard error of the mean	= 109.792
95 Percent confidence interval around the mean	= 32.891 - 463.27
99 Percent confidence interval around the mean	= -34.631 - 530.79

* Unbiased estimates of population *

Variance	= 144651.538
Standard deviation	= 380.331

* Data distribution coefficients *

Skewness	= 2.365
Kurtosis	= 7.520

Kolmogorov-Smirnov statistic for normality = 1.903

Valid cases	= 12
Missing cases	= 4
Response percent	= 75.0 %

TABLE 164

Acreage Planted by Retired Farmers

Total 1984 Acreage Planted-excl. pasture	Number	Percent
0020 =	1	8.3 %
0033 =	1	8.3 %
0040 =	1	8.3 %
0050 =	1	8.3 %
0080 =	1	8.3 %
0104 =	1	8.3 %
0112 =	1	8.3 %
0157 =	1	8.3 %
0158 =	1	8.3 %
0365 =	1	8.3 %
0490 =	1	8.3 %
1368 =	1	8.3 %
Total	12	100.0 %

Missing cases = 4
Response percent = 75.0 %

TABLE 165

Total Acreage of Retired Farmers (excluding largest 1)

Total 1984 Acreage Planted-excl. pasture

Minimum	= 20
Maximum	= 490
Range	= 470
Sum	= 1609
Mean	= 146.273
Median	= 104
Mode	= Multi-Modal
Variance	= 20266.744
Standard deviation	= 142.361
Standard error of the mean	= 45.019
95 Percent confidence interval around the mean	= 58.036 - 234.509
99 Percent confidence interval around the mean	= 30.350 - 262.196

* Unbiased estimates of population *

Variance	= 22293.418
Standard deviation	= 149.310

* Data distribution coefficients *

Skewness	= 1.421
Kurtosis	= 3.741

Kolmogorov-Smirnov statistic for normality = 2.370

Valid cases	= 11
Missing cases	= 4
Response percent	= 73.3 %

TABLE 166

Total Acreage of Retired Farmers (excluding largest 3)

Total 1984 Acreage Planted-excl. pasture

Minimum	= 20
Maximum	= 158
Range	= 138
Sum	= 754
Mean	= 83.778
Median	= 80
Mode	= Multi-Modal
Variance	= 2421.506
Standard deviation	= 49.209
Standard error of the mean	= 17.398
95 Percent confidence interval around the mean	= 49.678 - 117.878
99 Percent confidence interval around the mean	= 38.978 - 128.577

* Unbiased estimates of population *

Variance	= 2724.194
Standard deviation	= 52.194

* Data distribution coefficients *

Skewness	= 0.298
Kurtosis	= 1.669

Kolmogorov-Smirnov statistic for normality = 2.051

Valid cases	= 9
Missing cases	= 4
Response percent	= 69.2 %

TABLE 167

Total 1984 Acreage Planted-excl. pasture

Minimum	= 5
Maximum	= 1700
Range	= 1695
Sum	= 36543
Mean	= 309.686
Median	= 191
Mode	= 80
Variance	= 107360.520
Standard deviation	= 327.659
Standard error of the mean	= 30.292
95 Percent confidence interval around the mean	= 250.314 - 369.059
99 Percent confidence interval around the mean	= 231.684 - 387.689

* Unbiased estimates of population *

Variance	= 108278.132
Standard deviation	= 329.056

* Data distribution coefficients *

Skewness	= 1.814
Kurtosis	= 6.443

Kolmogorov-Smirnov statistic for normality = 8.986

Valid cases	= 118
Missing cases	= 18
Response percent	= 86.8 %

APPENDIX A : DRAFT QUESTIONNAIRE

Note: The following is Form A of an 11-page Questionnaire (plus a cover sheet) that was mailed in a stapled 12 page booklet form to 20 randomly selected members of the rural electric cooperatives. Form B differed in that the demographic questions 9-13 were placed at the end (numbers 29-33). Form C was identical to B except that the income question (#13 on A and #33 on B) was eliminated.

ENERGY USE STUDY
FOR RURAL WESTERN ILLINOIS

The Institute of Technology Assessment is conducting this survey for the Illinois Department of Energy and Natural Resources in cooperation with your electrical cooperative.

YOU CAN HELP

- the ILLINOIS DEPARTMENT OF ENERGY AND NATURAL RESOURCES find better ways to HELP YOU cope with rising energy costs

- your ELECTRIC COOPERATIVE control the rate at which electric rates are rising

by completing this Questionnaire.

ITA is distributing this Questionnaire to 600 scientifically selected members of four electrical cooperatives in Western Illinois. While we have a major interest in farming operations, we need information from non-farm residences as well. Your response is essential for obtaining useful results.

All answers will be held in the strictest confidence, and your name will not be associated with any numerical summary. Neither your electrical co-op nor any state or federal agency will see your completed questionnaire. (Unlike crop surveys, which are used to predict this year's crop, this survey focuses on your results in 1984. Any forecasts by the Department of Energy and Natural Resources, based on our summaries of all the Questionnaires, will be long range forecasts and will not be available in time to affect futures prices.)

There is no need to get exact numbers from old electric bills. On the last page of this Questionnaire we ask for your permission to have your co-op release information concerning your monthly KWH use. On dollar amounts for various energy supplies, please give your best estimates. It is important to this survey that you return the Questionnaire completed to the best of your ability promptly.

ENERGY USE STUDY

The Institute of Technology Assessment is conducting this survey for the Illinois Department of Energy and Natural Resources in cooperation with your electrical cooperative. Your responses will provide valuable information necessary for planning for future energy supplies at the lowest possible cost.

I. RESIDENTIAL ENERGY USE

1. How much of each of the following types of fuel did you purchase in 1984? Write your estimate of the total amount of each fuel you purchased, the total amount you paid for the fuel and the percent of each fuel you used for your household. (If all was for household, write 100%.)

TYPE OF FUEL	1984 AMOUNT PURCHASED	1984 AMOUNT PAID	PERCENT OF TOTAL USED FOR HOUSEHOLD
a) Electricity	_____KWH	$_____	_____%
b) Oil	_____Gallons	$_____	_____%
c) LP	_____Gallons	$_____	_____%
d) Natural Gas	_____Therms	$_____	_____%
e) Wood	_____Cords	$_____	_____%
f) Other (Specify below)			
_____	_____	$_____	_____%

2. Which of the following best describes the type of air conditioning you use in your home? (Check one.)

____ No air conditioning

____ Central air conditioning

____ Window air conditioning (How many units? _____)

3. What fuel do you use for your hot water heater? (Check one.)

____ Electricity ____ LP or Natural Gas

____ Oil ____ Other (Specify: _____)

4. Which of the following best describes the system your home has for distributing heat created by your primary source of heating? (Check one.)

____ Central hot air ____ Central hot water or steam

____ Individual room heating (# of rooms with heating units: ____)

____ Other (Specify: _____)

5. Please check the primary and secondary sources of heating fuel you use in your home. You should have only one primary source of heating fuel and as many secondary sources as apply.

SOURCE OF HEAT	PRIMARY	SECONDARY
a) Electric space heaters (How many? ____)	____	____
b) Electric baseboard	____	____
c) Electric ceiling cable	____	____
d) Electric furnace	____	____
e) Electric heat pump	____	____
f) Oil	____	____
g) LP	____	____
h) Natural gas	____	____
i) Wood furnace	____	____
j) Fireplace with inserts (How many? ____)	____	____
k) Fireplace without inserts (How many? ____)	____	____
l) Woodburning stove (How many? ____)	____	____
m) Kerosene space heaters (How many? ____)	____	____
n) Other (Specify: _____)	____	____

6. If you have changed your primary source of fuel for heating or hot water within the past ten years, or if you plan to do so in 1985, please provide the following information.

CHANGE IN ...	YEAR CHANGED	OLD FUEL	NEW FUEL
a) Heating fuel	_____	_____	_____
b) Hot water fuel	_____	_____	_____

7. If you have a solar installation that provides part of your household's hot water or heating needs, please provide the following information.

SOLAR POWER USE	YEAR INSTALLED	COST	PERCENT OF NEED PROVIDED BY SOLAR	SQUARE FOOTAGE OF COLLECTOR
a) Home heating	_____	$____	_____%	_____ sq. ft.
b) Water heating	_____	$____	_____%	_____ sq. ft.

8. Which of the following energy saving changes have you made within the past ten years? Please write the year the change was made and briefly describe the change.

CHANGE IN ...	YEAR	DESCRIPTION OF CHANGE
a) Heating thermostat setting	____	_____
b) Use of air conditioner	____	_____
c) Use of appliances	____	_____
d) Switch to "energy efficient" appliances	____	_____
e) Added conservation feature	____	_____
f) Use of alternative energy	____	_____
g) Other (Specify below)		
_____	____	_____
_____	____	_____

9. What is your age? _____

10. Excluding yourself, how many persons in each of the following categories resided in your home for at least six months during 1984?

AGE CATEGORIES	NUMBER OF PERSONS	AGE CATEGORIES	NUMBER OF PERSONS
Under 6	_____	45 - 54	_____
6 - 17	_____	55 - 64	_____
18 - 24	_____	65 - 74	_____
25 - 34	_____	75 and over	_____
35 - 44	_____		

11. Which of the following best describes the type of home in which you live? (Check one.)

____ One story home ____ Duplex

____ Two or more story home ____ Apartment

____ Mobile home ____ Other (Specify _____)

12. Excluding closets and bathrooms, how many rooms are there in your home? _____ Number of rooms

13. While we know this is sensitive for many people, please indicate the range of your total 1984 income from all sources. (Check one category under each heading.)

1984 GROSS INCOME	INCOME AFTER TAXES AND BUSINESS EXPENSES	
____ Net loss	____ Net loss	____ $ 2,000 - 4,999
____ $ 0 - 9,999	____ $ 0 - 499	____ $ 5,000 - 9,999
____ $10,000 - 19,999	____ $ 500 - 999	____ $10,000 -19,999
____ $20,000 - 29,999	____ $1,000 - 1,999	____ $20,000 or more
____ $30,000 - 39,999		
____ $40,000 or more		

14. How many of each of the following kinds of electrical meters, for which you are billed, do you have with your electrical cooperative?

KIND OF METER	NUMBER OF METERS	KIND OF METER	NUMBER OF METERS
a) Town, village or suburban residence	____	e) Farm operation (separate meter)	____
b) Seasonal residence	____	f) Farm residence and operation (combined meter)	____
c) Rural, non-farm residence	____	g) Other (Specify below)	
d) Farm residence (separate meter	____	_____	____

15. Based upon how you and your spouse spend your time and labor, which of the following best describes the occupational status for each of you? Place an "H" for husband, a "W" for wife or an "S" for single, if you are unmarried, in the spaces provided. (Check one category for each one of you.)

FARMING	NOT FARMING
____ Full-time farmer	____ Full-time job
____ Primarily a farmer, with off-the-farm job	____ Part-time job
____ Primarily employed off-the-farm, also farming	____ Unemployed
	____ Retired

INSTRUCTION: If you or your spouse are full-time or part-time farmers, please continue with Question #16 and complete the questionnaire. If neither of you are farmers, skip to Page #11.

II. FARM ENERGY USE

16. Please provide the information requested in the table below for each crop you harvested in 1984.

CROP	AVERAGE ACRES PLANTED ANNUALLY 1979-1983	ACRES PLANTED 1984	AMOUNT HARVESTED 1984	AMOUNT SOLD 1984	AMOUNT FOR LIVESTOCK 1984
a) Corn	____	____	____bu.	____bu.	____bu.
b) Soybeans	____	____	____bu.	____bu.	
c) Wheat	____	____	____bu.	____bu.	____bu.
d) Milo	____	____	____bu.	____bu.	____bu.
e) Corn silage	____	____	____tons	____tons	____tons
f) Haylage	____	____	____tons	____tons	____tons
g) Alfalfa	____	____	____tons	____tons	____tons
h) Other hay	____	____	____tons	____tons	____tons
i) Other (Specify) _____	____	____	____	____	____

17. How many bushels of corn and soybeans from your 1984 harvest did you dry? ____ bu/corn ____ bu/beans

18. What is your usual crop rotation cycle? (Check one.)

____ No crop rotation cycle ____ 3 year rotation

____ 2 year rotation ____ Other cycle (Specify: _____)

19. When and how do you do your primary fertilizing?

_____ Fall broadcast

_____ Spring broadcast

_____ Spring band

20. How much fertilizer, pesticide and herbicide did you use on your crops during 1984? For each crop listed below, please provide the information requested under each heading.

	CROPS		
FERTILIZER/PESTICIDE/HERBICIDE	CORN	SOYBEANS	OTHER
Nitrogen - lbs. (N)/acre	____	____	____
Phosphate - lbs. (P205)/acre	____	____	____
Potash - lbs. (K20)/acre	____	____	____
Pesticide - pints/acre, undiluted	____	____	____
____ (type or brand)	( )	( )	( )
Herbicide - pints/acre, undiluted	____	____	____
____ (type or brand)	( )	( )	( )
Manure ____ - lbs./acre	____	____	____
Liquid Manure - gals./acre	____	____	____

21. If you contracted your crop drying, how many bushels did you contract and how much did you pay per bushel?

____ Number of bushels dried $_____ per bushel

22. Did you have your soil tested in either 1983 or 1984?

____ Yes, 1983 ____ Yes, 1984 ____ No

23. Except for what you may have done on 50-50 shares, which of the following kinds of contract work did you hire on a cost per acre basis in 1984?

CONTRACT WORK	NUMBER OF ACRES	COST PER ACRE
a) Pre-planting work	_____	$_____ per acre
b) Planting	_____	$_____ per acre
c) Fertilizer application	_____	$_____ per acre
d) Chemical application	_____	$_____ per acre
e) Cultivation	_____	$_____ per acre
f) Harvesting	_____	$_____ per acre
g) Other (Specify: _____)	_____	$_____ per acre

24. Please estimate the amount of money you paid for electricity for each of the following farm operations during 1984. (Write "0" if you used no electricity for an operation.)

FARM OPERATION	AMOUNT PAID FOR ELECTRICITY
a) Crop drying (mechanical equipment)	$_____
b) Crop drying (heat)	$_____
c) Space heat for animal confinement	$_____
d) Heat lamps for farrowing crates	$_____
e) Ventilation for animal confinement	$_____
f) Irrigation/water pumping	$_____
g) Other farm operations use (Specify below)	
_____	$_____
_____	$_____
h) Total amount paid for electricity for farm operations	$_____

25. Did you have a separate electrical meter for any of the following farm operations during 1984? (Check as many as apply.)

____ Crop drying ____ Irrigation/water pumping

____ Animal confinement ____ Other (Specify: _____)

26. Please estimate the amount of LP gas you purchased for each of the following farm operations during 1984. (Write "0" if you used no LP gas for an operation.)

FARM OPERATION	GALLONS OF LP GAS IN 1984
a) Crop drying	_____Gallons of LP
b) Heat for animal confinement	_____Gallons of LP
c) Irrigation/water pumping	_____Gallons of LP
d) Other farm operations use (Specify below)	
_____	_____Gallons of LP
_____	_____Gallons of LP
e) Total gallons purchased for farm operations	_____Gallons of LP

27. Please estimate the amount of diesel fuel and gasoline you purchased for each of the following farm operations during 1984. (Write "0" if you used no diesel fuel or gasoline for an operation.)

FARM OPERATION	GALLONS OF DIESEL	GALLONS OF GASOLINE
a) Contract work done by you off your farm	_____Gallons	_____Gallons
b) Field operations on your farm	_____Gallons	_____Gallons
c) Irrigation/water pumping on your farm	_____Gallons	_____Gallons
d) Livestock management	_____Gallons	_____Gallons
e) Other farm operations use (Specify below)		
_____	_____Gallons	_____Gallons
_____	_____Gallons	_____Gallons

28. How much livestock feed did you purchase in 1984?

LIFESTOCK FEED	AMOUNT PURCHASED	AVERAGE UNIT COST
a) Corn	_____	$_____per bushel
b) Soybean meal	_____	$_____per pound
c) Feed supplement	_____	$_____per pound
d) Other (Specify: _____)	_____	$_____per _____

29. Please estimate the amount of solid manure (in tons) and liquid manure (in gallons) that you produced, used as fertilizer, processed, and discarded in 1984.

TYPE OF MANURE	TONS/GALS. PRODUCED	TONS/GALS. USED AS FERTILIZER	TONS/GALS. PROCESSED	TONS/GALS. DISCARDED
a) Solid manure	_____ tons	_____ tons	_____ tons	_____ tons
b) Liquid manure	_____ gals	_____ gals	_____ gals	_____ gals

30. If you processed any manure during 1984, what processing method did you use? (Check as many as apply.)

____ Composted

____ Anaerobic

____ Other (Specify: _____)

31. What was the size of your livestock operation in 1984? For each part of your livestock operation please provide the information requested below.

LIVESTOCK OPERATION	RESPONSES
a) How many farrow-to-finish sows did you have in 1984?	_____ Number of sows
b) How many farrow-to-feeder sows did you have in 1984?	_____ Number of sows
c) How many feeder-to-finish hogs did you have in 1984?	_____ Head of hogs
d) How many beef cattle did you have in your commercial herd in 1984?	_____ Head of beef cattle
e) How many cattle did you have in your feedlot herd in 1984?	_____ Head of cattle
f) How many milking cows did you have in your dairy herd in 1984?	_____ Head of milkers
g) How many pounds of milk did your dairy herd produce in 1984?	_____ Pounds of milk
h) Other livestock operation (Specify below)	
_____	_____ Number of animals
_____	_____ Amount of produce

32. If you have alternate energy installations of any sort (solar, wind, biomass, wood or other) that provides part of your farm operations energy for heating or hot water, please provide the following information.

FARM OPERATION	TYPE OF ALTERNATE ENERGY SOURCE	YEAR INSTALLED	COST OF INSTALLATION	PERCENT OF TOTAL NEED SUPPLIED
a) Water heating	_____	____	$_____	_____%
b) Air heating	_____	____	$_____	_____%
c) Other (Specify below)				
_____	_____	____	$_____	_____%
_____	_____	____	$_____	_____%

33. Have you made changes in your operating practices in any of the following within the past five years? If so, please describe the change and estimate the amount of savings per year you realized by making the changes.

OPERATING PRACTICE	YEAR CHANGED	DESCRIPTION	ANNUAL AMOUNT SAVED
a) Plowing	____	_____	$_____
b) Cultivating	____	_____	$_____
c) Irrigation/water pumping	____	_____	$_____
d) Fertilizing	____	_____	$_____
e) Herbicide application	____	_____	$_____
f) Pesticide application	____	_____	$_____
g) Crop drying	____	_____	$_____
h) Livestock management	____	_____	$_____
i) Other (Specify below)			
_____	____	_____	$_____
_____	____	_____	$_____

Please turn to page 11 for the final item.

34. Thank you very much for your cooperation in completing the questionnaire. We have one final request. In order to help the Illinois Department of Energy and Natural Resources develop programs to help rural Illinoisians, and to save you the trouble of looking up old bills, we need to obtain a record of your monthly KWH usage from your Electrical Co-op. Please release your Co-op to give us this information by signing your name and giving us your address in the spaces provided below.

_____ _____

SIGNATURE DATE

Please print your name and address below.

NAME: _____

STREET ADDRESS OR RR#: _____

CITY: _____

NAME OF YOUR ELECTRICAL CO-OP: _____

APPENDIX B : The Rural Cooperative Manager's Letter

Note: This letter, on the pertinent rural electric cooperative's letterhead and signed by the pertinent manager was sent on July 5 to the pre-test sample of 20 and on July 19 to all recipients of the final Questionnaire. In both cases the Questionnaire was sent out several days later.

In several days you will be receiving a questionnaire from the Institute of Technology Assessment about your use of energy - all kinds of energy.

The Institute is doing the survey for the Illinois Department of Energy and Natural Resources and has asked for the help of the Rural Electric Cooperatives.

The Department is looking for ways to help the Illinois rural agricultural economy. Accurate information is essential if good decisions are to be made.

The questionnaire has been designed to be as easy as possible to fill out. You have been selected as part of a small scientific sample to participate. We ask you to take the time to answer the questionnaire when it arrives. A little of your time invested now will help the state and your cooperative make decisions that will help hold energy prices down.

Sincerely,

APPENDIX C : The Cover Letter for the Questionnaire

Note: This letter was enclosed, along with a stamped self-addressed envelope, with the Questionnaire, which was sent on July 25, 1985.

The Institute of Technology Assessment, Inc.

LELAND BUILDING, 6TH & CAPITOL SPRINGFIELD, ILLINOIS 62701 (217) 544-5577

July 25, 1985

You can help provide answers for rising energy costs - and maybe win $250.

Rising energy costs are difficult for all of us to cope with. Your Illinois Department of Energy and Natural Resources is looking for solutions.

You can help. Good decisions require good facts - facts that only you can provide about your use of energy.

This survey is being done for the Illinois Department of Energy and Natural Resources by the Institute of Technology Assessment, a private firm. Your name will not be used in any report. Neither your electrical co-op nor any state or federal agency will see your completed survey.

The survey is short. It will take 10 to 20 minutes to fill out. That is a small investment which will pay off in a better energy future for all of us - especially important to the farm economy.

You may also win $250 by returning the survey to us before Monday, August 5. (See page 7 of the survey for details of how to win.)

You are one of 600 carefully selected people to participate in this project, and the success of the project depends on you. Please take a few minutes now. Send your completed questionnaire back to us in the stamped self-addressed envelope.

Thank you for your help.

Sincerely,

Luther W. Skelton, Ph.D.
Director

P.S. Please feel free to put your comments about the survey on the back page of the questionnaire. We will be glad to forward to your electrical co-op or to the Department of Energy and Natural Resources any suggestions you have for them, and will do it without your name attached.

APPENDIX D : THE QUESTIONNAIRE

Note: The final Questionnaire was an eight page pamplet, 8½ X 11", folded and stapled on the spine. Page 1 was the cover and (unnumbered) page 8 the back-cover, inviting comments.

ENERGY USE SURVEY

The INSTITUTE OF TECHNOLOGY ASSESSMENT, a private firm, is conducting this survey for the ILLINOIS DEPARTMENT OF ENERGY AND NATURAL RESOURCES (DENR). Your responses about your energy use will help DENR help you get more for your energy dollar. The confidentiality of your answers is assured.

I. RESIDENTIAL ENERGY USE

1. Which of the following best describes your home? (Check one.)

   _____One story home _____Mobile home

   _____Two or more story home _____Other (Specify:_____)

2. During which of the following time intervals was your home built? If you do not know, please give us your best guess. (Check one.)

   _____Built before 1940 _____1960-1974 _____Built in 1980 or since

   _____1940-1959 _____1975-1979

3. Excluding closets and bathrooms, how many rooms do you have in your home? _____Rooms

4. Do you own, or rent, your home? (Check one.)

   _____Own _____Rent Comment:_____

5. Which of the following does your home have? (Check all that apply.)

   _____Attic insulation _____Wall insulation

   _____Double pane windows _____Storm windows

   _____Passive solar construction _____Solar collectors

6. Which of the following best describes the type of air conditioning you use in your home?

   _____No air conditioning _____Central air conditioning

   _____Window air conditioning (How many units?_____)

7. Which of the following energy saving changes have you made during the past ten years? Check as many as apply; for each item you check, write the year in which you made the change, and describe it.

CHANGE IN . . .	YEAR	DESCRIPTION OF CHANGE
_____Heating practices	____	_____
_____Cooling practices	____	_____
_____Other appliance usage	____	_____
_____Weatherstripping/caulking	____	_____
_____Other	____	_____

8. Please check the primary and secondary fuels and systems for heating your home. Do not include fuel for your hot water heater in this question. You should check only one primary heating fuel, and as many secondary fuels as apply.

FUEL AND SYSTEM	PRIMARY	SECONDARY
Electric furnace (central heating)	____	____
Electric heat pump (How many units?_____)	____	____
Electric ceiling cable	____	____
Electric baseboard	____	____
Electric space heaters (How many units?_____)	____	____
LP or Natural Gas (central heating)	____	____
LP or Natural Gas space heaters (How many units?_____)	____	____
Oil (central heating)	____	____
Wood (central heating)	____	____
Wood-burning stove (How many units?_____)	____	____
Fireplace with inserts (How many units?_____)	____	____
Fireplace without inserts (How many units?_____)	____	____
Kerosene space heaters (How many units?_____)	____	____
Other (Specify:_____)	____	____

9. What fuel do you use for your hot water heater? (Check one.)

_____Electricity _____LP or Natural Gas

_____Oil _____Other (Specify:_____)

10. If you have changed your primary source of fuel for heating or hot water within the past ten years, or if you plan to do so in 1985, please provide the following information.

CHANGE IN . . .	YEAR CHANGED	OLD FUEL	NEW FUEL
a) Heating fuel	_____	_____	_____
b) Hot water fuel	_____	_____	_____

11. How much of each of the following types of fuel did you purchase or use in 1984 for household use? (Write "0" if you used none of a given fuel.) Please write your best estimate of the total amount of each fuel you used and the total amount you paid for it.

TYPE OF FUEL	1984 AMOUNT USED	1984 AMOUNT PAID
a) Electricity	_____KWH	$_____
b) Oil	_____Gallons	$_____
c) LP	_____Gallons	$_____
d) Natural Gas	_____Therms	$_____
e) Wood	_____Cords	$_____
f) Other (Specify)	_____	$_____

12. Including yourself, how many persons in each of the following age categories resided in your home for at least six months during 1984?

AGE CATEGORIES	NUMBER OF PERSONS	AGE CATEGORIES	NUMBER OF PERSONS	AGE CATEGORIES	NUMBER OF PERSONS
Under 6	_____	25 - 34	_____	55 - 64	_____
6 - 17	_____	35 - 44	_____	65 - 74	_____
18 - 24	_____	45 - 54	_____	over 75	_____

13. Based upon the way you and your spouse spend your time and labor, which of the following best describes the occupational status for each of you? Place an "H" for husband, a "W" for wife, or an "S" for single if you are unmarried, in the space provided. (Please check one category for each one of you.)

FARMING	NOT FARMING
_____Full-time farmer	_____Full-time job
_____Full-time farm employee	_____Part-time job
_____Primarily a farmer, with off-the-farm job	_____Full-time homemaker
_____Primarily employed off-the-farm, also farming	_____Unemployed
	_____Retired

INSTRUCTION

If you or your spouse are full-time or part-time farmers, please describe your operation below and continue with Question #14. If neither of you are farmers, skip to Page #7 to qualify for a prize.

How would you describe your farming operation?_____

_____

II. FARM ENERGY USE

ELECTRICAL ENERGY USE

14. For which of the following farm operations did you use any electricity during 1984? (Check as many as apply; write a "0" if you did not perform an operation or did not use electricity for it.)

_____Crop drying (mechanical equipment)	_____Conveyors for animal feed
_____Crop drying (heat)	_____Walk-in refrigerator
_____Ventilation for animal confinement	_____Bulk milk tank (compressor)
_____Space heat for animal confinement	_____Automatic milker (compressor)
_____Heat lamps for farrowing crates	_____Irrigation/water pumping
_____Grinders for animal feed	_____Other (Specify:_____)

15. Did you have a separate electrical meter for any of the following farm operations during 1984? (Check all that apply.)

_____Crop drying _____Irrigation/water pumping

_____Animal confinement _____Other (Specify:_____)

LP ENERGY USE

16. Please estimate the amount of LP gas you purchased for each of the following farm operations during 1984. (Write "0" if you used no LP gas for a given farm operation.)

1984 FARM OPERATIONS	1984 LP GAS PURCHASES
a) Crop drying	_____Gallons of LP
b) Heat for animal confinement	_____Gallons of LP
c) Irrigation/water pumping	_____Gallons of LP
d) Other farm operations use (Specify below)	
_____	_____Gallons of LP
e) Total gallons purchased for farm in 1984	_____Gallons of LP

MOTOR FUEL ENERGY USE

17. Please estimate the amount of diesel fuel and gasoline you purchased for each of the following farm operations during 1984. (Write "0" if you used no diesel fuel or gasoline for an operation.)

1984 FARM OPERATIONS	AMOUNT OF DIESEL	AMOUNT OF GASOLINE
a) Contract work done by you off your farm	_____Gallons	_____Gallons
b) Field operations on your farm	_____Gallons	_____Gallons
c) Irrigation/water pumping	_____Gallons	_____Gallons
d) Other farm operations use (Specify below)		
_____	_____Gallons	_____Gallons
e) Total gallons purchased for farm in 1984	_____Gallons	_____Gallons

ALTERNATE ENERGY USE

18. If you have alternate energy installations of any sort (solar, wind, biomass, wood, etc.) that provide part of your farm operation's energy, please provide the following information.

FARM OPERATION	TYPE OF ALTERNATE ENERGY	YEAR INSTALLED	COST OF INSTALLATION	PERCENT OF TOTAL NEED SUPPLIED
a) Water heating	_____	_____	$_____	_____%
b) Air heating	_____	_____	$_____	_____%
c) Other (Specify)	_____	_____	$_____	_____%

EMBEDDED ENERGY USE

A large amount of the energy used on farms is contained in certain products such as fertilizer, chemicals, and animal feeds. All of these require petroleum as a feed stock or in the production process. In order to estimate your total energy input for 1984, we need these figures along with those for the more obvious forms of energy.

19. Please give the total amount of each of the following fertilizers you purchased for use in 1984.

FERTILIZER	AMOUNT	FERTILIZER	AMOUNT
a) Nitrogen	_____lbs. of N	d) Other: (State fertilizer product and amount)	
b) Phosphate	_____lbs. of P205	_____	_____
c) Potash	_____lbs. of K20	_____	_____

20. Please give the name and the total undiluted amount of each chemical (herbicide/pesticide) you purchased for use in 1984.

CHEMICAL PRODUCT	1984 AMOUNT USED	CHEMICAL PRODUCT	1984 AMOUNT USED
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

21. Do your fertilizer or chemical purchases for 1984 include any which you used in doing contract or custom work for another farmer?

_____No _____Yes

22. How much livestock feed did you purchase for use in 1984?

LIVESTOCK FEED	AMOUNT PURCHASED
a) Corn	_____
b) Soybean meal	_____
c) Feed supplement	_____
d) Other (Specify:_____)	_____

FARMING METHODS

Your farming methods may have a considerable impact upon your energy use. Please answer as many of the following as you can.

23. Did you hire any of the following custom work to be done for you on your farm by contract? (Check as many as apply; please write "0" in the spaces provided if you hired no such work.)

_____Pre-planting work _____Cultivation

_____Planting _____Harvesting

_____Fertilizer application _____Crop drying

_____Chemical application _____Other (Specify:_____)

24. What is your usual crop rotation cycle? (Check one.)

_____No crop rotation cycle _____3 year rotation cycle

_____2 year rotation cycle _____Other (Specify:_____)

25. When and how do you do your primary fertilizing?

_____Fall broadcast _____Spring broadcast _____Spring band application

26. Did you have your soil tested in either 1983 or 1984? (Check one.)

_____Yes, 1983 _____Yes, 1984 _____No

27. Please estimate the amount of solid manure (in tons) and liquid manure (in gallons) that you produced, used as fertilizer, processed, and discarded in 1984.

TYPE OF MANURE	AMOUNT PRODUCED	AMOUNT USED AS FERTILIZER	AMOUNT PROCESSED	AMOUNT DISCARDED
Solid manure	_____Tons	_____Tons	_____Tons	_____Tons
Liquid manure	_____Gals.	_____Gals.	_____Gals.	_____Gals.

28. If you processed any manure during 1984, what processing method did you use? (Check as many as apply.)

_____Composted _____Anaerobic _____Other (Specify:_____)

29. Have you made changes in your operating practices in any of the following within the past five years? If so, please describe the changes and estimate the amount of savings per year you realized by making the changes.

OPERATING PRACTICE	YEAR CHANGED	DESCRIPTION	ANNUAL AMOUNT SAVED
Plowing	_____	_____	$_____
Cultivating	_____	_____	$_____
Irrigation/water pumping	_____	_____	$_____
Fertilizing	_____	_____	$_____
Herbicide application	_____	_____	$_____
Pesticide application	_____	_____	$_____
Crop drying	_____	_____	$_____
Livestock management	_____	_____	$_____
Other (Specify below)			
_____	_____	_____	$_____

30. How many acres of each crop did you plant in 1984 and how would you estimate your usual acreage for each crop? (If you worked on a shares basis, include only your portion. Do not count acreage which you worked as a paid employee, or on a contract or custom basis.)

CROP	1984 ACREAGE	USUAL ACREAGE	CROP	1984 ACREAGE	USUAL ACREAGE
a) Corn	_____Acres	_____Acres	b) Soybeans	_____Acres	_____Acres
c) Other (Specify)			c) _____	_____Acres	_____Acres
c) _____	_____Acres	_____Acres	c) _____	_____Acres	_____Acres

Thank you very much for your cooperation in completing the survey. We have one final request. To save you the trouble of looking up old bills we need your permission to obtain a record of your monthly KWH usage from your co-operative. Your signature below will grant that permission.

_____ _____

Signature Date

CASH PRIZE DRAWING

To win a cash prize of $250 you must (a) complete the survey, and (b) come the closest of all contestants to guessing the winning number between 0 and 4999.

The person completing the survey whose number is closest to the randomly chosen winning number below 5000 will receive a prize of:

$250 if the returned survey is postmarked on or before August 5, 1985.

$150 if the returned survey is postmarked between August 6, and August 16, 1985.

$100 if the returned survey is postmarked between August 17, and August 26, 1985.

Surveys received with a postmark after August 26, 1985, will be appreciated but will be ineligible for the prize. In case of ties, the person whose reply is postmarked earliest will win. If the winning entries have the same postmark, the prize will be split.

My number is (Write a number between 0 and 4999 in the box.) ____

The winner will be determined on August 30, 1985 and will be notified immediately. If all 600 people fill out the survey, your chances of winning will be one in 600.

Please print your name and address below:

Name: _____

Street Address or RR #: _____

City: _____

Telephone Number: _____

COMMENTS

SUGGESTIONS TO YOUR ELECTRICAL CO-OP

SUGGESTIONS TO THE DEPARTMENT OF ENERGY AND NATURAL RESOURCES

APPENDIX E : The Cover Letter for the Second Mailing of the Questionnaire

Note: Those members of the original sample who had not returned the Questionnaire were mailed a second one - an identical package except for the new, more urgent, cover letter.

The Institute of Technology Assessment, Inc.

LELAND BUILDING, 6TH & CAPITOL SPRINGFIELD, ILLINOIS 62701 (217) 544-5577

August 7, 1985

You may have misplaced, forgotten, or just decided not to return the energy use survey we sent you two weeks ago.

You have a second chance.

A second chance to win $150.00

A second chance to help us get the right facts about energy use in Western Illinois. Energy costs are going up. There is no question about that. Something has to be done. Something will be done. But will it help? That depends at least in part on you providing the necessary information for good decisions to be made.

The Institute of Technology Assessment is doing this survey for the Illinois Department of Energy and Natural Resources and with the cooperation of the rural electric cooperatives. No state or cooperative official, however, will see your completed survey.

Check page 7 of your survey for how you can win $150.00.

Then take 20 minutes of your time . . . right now . . . to help us help you and return the completed survey in the self-addressed stamped envelope. Your help is much appreciated.

Sincerely,

Luther W. Skelton

Luther W. Skelton, Ph.D.
Director

APPENDIX F : The Protocol for the Telephone Prompt

Note: After the postmark date qualifying respondents for a chance at the full $250 cash award had passed, four assistants called those who had not yet returned the Questionnaire. The calls had the explicit purpose of finding out the farmer-status of the non-respondents, and the implicit purpose of encouraging a response.

Hello, my name is (NAME OF INTERVIEWER) . May I speak with Mr/Mrs (NAME OF RESPONDENT) . A week ago, the Institute of Technology Assessment sent a questionnaire to you for the Department of Energy and Natural Resources. I am calling you because we haven't yet received your completed questionnaire.

1. During the past two weeks, did you receive a questionnaire which requested information about your use of different kinds of energy during 1984?

YES. . . . . .1 (ASK QUESTION #2 AND CONTINUE)

NO . . . . . .2 (VERIFY ADDRESS AND SKIP TO REMARK "B")

DON'T KNOW/MAYBE . .3 (GO TO REMARK "B")

REFUSAL. . . . . .9 (GO TO REMARK "B")

2. Have you returned your completed questionnaire to us?

YES. . . . . .1 (GO TO REMARK "A")

NO . . . . . .2 (GO TO REMARK "B")

DON'T KNOW . . . . .3 (GO TO REMARK "B")

REFUSAL. . . . . .9 (GO TO REMARK "B")

REMARK "A": Thank you for helping us. You may receive a second copy of the questionnaire sometime during the next day or so. If the questionnaire is the same one you returned to us, please disregard it. We will notify you by telephone if you win the prize money; if someone else wins, you will find out the winner's name from your Rural Electric News. (INTERVIEWER: ASK QUESTION #4)

REMARK "B": You can still win $150 if your response is postmarked on or before August 16. We have sent a second copy of the questionnaire to you. Please help us complete this survey successfully. The Department of Energy and Natural Resources needs accurate facts to help you get the most for your energy dollar. (INTERVIEWER: ASK QUESTIONS #3 AND #4)

3. Will you complete the questionnaire and return it to us?

YES. . . . . 1 DON'T KNOW 3

NO . . . . . 2 REFUSAL. 9

4. Also, we would like to know if you or spouse spend any of your time in farming?

HUSBAND DOES . . . 1 NEITHER DO 3

WIFE DOES. . . . . 2 REFUSAL. 9

Thank you. We look forward to receiving your completed questionnaire.

APPENDIX G : The Codebooks

Note: This Appendix is divided into six parts:

G.1. is a general explanation of the codebooks

G.2. is a listing of REUSRC1

G.3. is a discussion of selected variables of REUSRC1

G.4. is a listing of REUSFC1

G.5. is a listing of REUSFC2

G.6. is a discussion of selected variables of REUSFC1 and REUSFC2

G.1. General Explanation of the Codebooks

Each codebook governs the contents of a data file. REUSRC1 controls data file DEUSRC2, which contains 353 records of data primarily from the residential part of the survey. REUSFC1 controls DEUSFC1, which contains most of the quantitative farming data, while REUSFC2 controls DEUSFC2, which contains farming data that would not fit into DEUSFC1. Both farm files contain 136 records only.

Variable #1 of each codebook is a three-digit "Respondent #" -- each number permanently associated with one of the 589 recipients of the Questionnaire. The variable names -- for example, "12a. Number in home under 6 years old", the name of Variable #2 in REUSRC1 -- often begin with a numeral corresponding to a Question # in the survey, and include a brief reference to the question. (StatPac allows a maximum of 40 characters or spaces for a variable name.) A question such as #12 must be divided into 9 variables since a respondent could put a number in front of any or all the nine age categories. Only a single column is devoted to each of Variables #2 - #10, since it is unlikely that any household will have more than 9 members in a single age category.

Some variable names do not begin with a reference to a Question # from the Survey, for example, Variable #11 ("Number of Persons in Household"). The Survey did not ask for the total number in the household. Variable #11 is the result of computing the sum of Variables #2 - #10.

Most of the variables call for a coded representation of the

responses. For example, Question 13 of the survey called for an H (for husband), W (for wife), or S (for single respondents) to be placed in front of the appropriate one or two of nine occupational status categories. These categories are identified by variable numbers 13-21. The codes to be marked for each of these variables are: blank if no letter, 1 if H, 2 if W, 3 if both H and W, or 4 if S appears by an occupational status.

Variable lables are limited in StatPac to 16 characters and are not always self-explanatory. Following the listing of REUSRC1, those variables and variable labels which are not self-expanatory are discussed briefly.

APPENDIX G.2.

Codebook listing - REUSRC1

Variable # 1 - Respondent #
Start column = 1 Number of columns = 3 Type = Numeric

Variable # 2 - 12a. Number in home under 6 years old.
Start column = 4 Number of columns = 1 Type = Numeric

Variable # 3 - 12b. Number in home aged 6-17.
Start column = 5 Number of columns = 1 Type = Numeric

Variable # 4 - 12c. Number in home aged 18-24.
Start column = 6 Number of columns = 1 Type = Numeric

Variable # 5 - 12d. Number in home aged 25-34.
Start column = 7 Number of columns = 1 Type = Numeric

Variable # 6 - 12e. Number in home aged 35-44.
Start column = 8 Number of columns = 1 Type = Numeric

Variable # 7 - 12f. Number in home aged 45-54.
Start column = 9 Number of columns = 1 Type = Numeric

Variable # 8 - 12g. Number in home aged 55-64.
Start column = 10 Number of columns = 1 Type = Numeric

Variable # 9 - 12h. Number in home aged 65-74.
Start column = 11 Number of columns = 1 Type = Numeric

Variable # 10 - 12i. Number in home over 75 years old.
Start column = 12 Number of columns = 1 Type = Numeric

Variable # 11 - Number of Persons in Household
Start column = 13 Number of columns = 2 Type = Numeric

Variable # 12 - Approx. average age of household adults
Start column = 15 Number of columns = 4 Type = Numeric

Variable # 13 - 13a. Occupational status: FT farmer.
Start column = 19 Number of columns = 1 Type = Numeric

1=H
2=W
3=H,W
4=S

Variable # 14 - 13b. Occupational status: FT farm employ
Start column = 20 Number of columns = 1 Type = Numeric

1=H
2=W
3=H,W
4=S

Variable # 15 - 13c. Primarily farmer, w/off-farm job.
Start column = 21 Number of columns = 1 Type = Numeric

1=H
2=W
3=H,W
4=S

Variable # 16 - 13d. Primarily off farm, also farming.
Start column = 22 Number of columns = 1 Type = Numeric

1=H
2=W
3=H,W
4=S

Variable # 17 - 13e. NOT FARMING: full-time job.
Start column = 23 Number of columns = 1 Type = Numeric

1=H
2=W
3=H,W
4=S

Variable # 18 - 13f. NOT FARMING: part-time job.
Start column = 24 Number of columns = 1 Type = Numeric

1=H
2=W
3=H,W
4=S

Variable # 19 - 13g. NOT FARMING: full-time homemaker.
Start column = 25 Number of columns = 1 Type = Numeric

1=H
2=W
3=H,W
4=S

Variable # 20 - 13h. NOT FARMING: Unemployed.
Start column = 26 Number of columns = 1 Type = Numeric

1=H
2=W
3=H,W
4=S

```
Variable # 21 - 13i. NOT FARMING: Retired.
Start column = 27     Number of columns = 1     Type = Numeric

          1=H
          2=W
          3=H,W
          4=S
-------------------------------------------------------------------
Variable # 22 - DID RESPONDENT CHECK FARMING/CONTINUE Q?
Start column = 28     Number of columns = 1     Type = Numeric

          1=FARMING & contin
          2=FARMING but stop
          3=NOT FARM & stop
          4=NOT FARM, contin
-------------------------------------------------------------------
Variable # 23 - FARM QUESTIONS ANSWERED? ENERGY DATA?
Start column = 29     Number of columns = 1     Type = Numeric

          0=Residential only
          1=Farm
          2=F-no F.En.data
          3=F-no R.El.data
          4=Res.-new in '85
-------------------------------------------------------------------
Variable # 24 - Page 7 - Is the Release signed?
Start column = 30     Number of columns = 1     Type = Numeric

          1=signed
          2=not signed
-------------------------------------------------------------------
Variable # 25 - Respondent's Comments on Page 8
Start column = 31     Number of columns = 1     Type = Numeric

          1=no comments
          2=Q-related only
          3=pos.on Co-op
          4=hi$:neg.on Co-op
          5=hi$:nuclear
          6=hi$:Clinton
          7=hi$:general
          8=miscellaneous
-------------------------------------------------------------------
Variable # 26 - 1. Which best describes your home?
Start column = 32     Number of columns = 1     Type = Numeric

          1=one story
          2=two or more
          3=mobile home
          4=split lev/1.5 st
          5=camp
          9=Other:APPENDIX A
-------------------------------------------------------------------
```

Variable # 27 - 2. When was your home built?
Start column = 33 Number of columns = 1 Type = Numeric

1=before 1940
2=1940-59
3=1960-74
4=1975-79
5=1980 or since

Variable # 28 - 3. How many rooms do you have in home?
Start column = 34 Number of columns = 2 Type = Numeric

Variable # 29 - 4. Do you own, or rent, your home?
Start column = 36 Number of columns = 1 Type = Numeric

1=own
2=rent
5=comment

Variable # 30 - 5a. Does your home have attic insul?
Start column = 37 Number of columns = 1 Type = Numeric

1=checked
2=not checked

Variable # 31 - 5b. Does your home have dbl pane windows
Start column = 38 Number of columns = 1 Type = Numeric

1=checked
2=not checked

Variable # 32 - 5c. Passive solar construction?
Start column = 39 Number of columns = 1 Type = Numeric

1=checked
2=not checked

Variable # 33 - 5d. Does your home have wall insul?
Start column = 40 Number of columns = 1 Type = Numeric

1=checked
2=not checked

Variable # 34 - 5e. Does your home have storm windows?
Start column = 41 Number of columns = 1 Type = Numeric

1=checked
2=not checked

Variable # 35 - 5f. Solar collectors?
Start column = 42 Number of columns = 1 Type = Numeric

1=checked
2=not checked

Variable # 36 - 8. Primary fuel & system for home heat.
Start column = 43 Number of columns = 2 Type = Numeric

01=elec.furnace-cen
02=elec.heat pump
03=elec.ceiling cab
04=elec.baseboard
05=elec.space heatr
06=LP or NG central
07=LP or NG sp.htrs
08=oil (central)
09=wood (central)
10=wood stove
11=fp w/inserts
12=fp w/o inserts
13=kerosene sp.htrs
14=other

Variable # 37 - Primary Fuel
Start column = 45 Number of columns = 1 Type = Numeric

1=electric
2=gas
3=oil
4=wood
5=fp w/o insert
6=kerosene
7=other

Variable # 38 - 8a. Electric furnace - Secondary
Start column = 46 Number of columns = 1 Type = Numeric

1=el.furn.

Variable # 39 - 8b. Electric heat pump - Secondary
Start column = 47 Number of columns = 1 Type = Numeric

1=ht.pump

Variable # 40 - 8c. Electric ceiling cable - Secondary
Start column = 48 Number of columns = 1 Type = Numeric

1=el.cable

Variable # 41 - 8d. Electric baseboard - Secondary
Start column = 49 Number of columns = 1 Type = Numeric

1=el.bb.

Variable # 42 - 8e. Electric space heaters - Secondary
Start column = 50 Number of columns = 1 Type = Numeric

1=el.sp.htr.

Variable # 43 - 8f. LP or NG (central) - Secondary
Start column = 51 Number of columns = 1 Type = Numeric

1=gas-central

Variable # 44 - 8g. LP or NG space heaters - Secondary
Start column = 52 Number of columns = 1 Type = Numeric

1=gas sp.htr.

Variable # 45 - 8h. Oil (central) - Secondary
Start column = 53 Number of columns = 1 Type = Numeric

1=oil

Variable # 46 - 8i. Wood (central) - Secondary
Start column = 54 Number of columns = 1 Type = Numeric

1=wd-central

Variable # 47 - 8j. Wood-burning stove - Secondary
Start column = 55 Number of columns = 1 Type = Numeric

1=wd stove

Variable # 48 - 8k. Fireplace with inserts - Secondary
Start column = 56 Number of columns = 1 Type = Numeric

1=fp+insert

Variable # 49 - 8l. Fireplace w/o inserts - Secondary
Start column = 57 Number of columns = 1 Type = Numeric

1=fp w/o insert

Variable # 50 - 8m. Kerosene space heaters - Secondary
Start column = 58 Number of columns = 1 Type = Numeric

1=kero.sp.htr.

Variable # 51 - 8n. Other - Secondary
Start column = 59 Number of columns = 1 Type = Numeric

1=other

Variable # 52 - Secondary Fuel
Start column = 60 Number of columns = 1 Type = Numeric

1=electric
2=gas
3=oil
4=wood
5=fp w/o insert
6=kerosene
7=other

Variable # 53 - 8. Electric heat pump - how many units?
Start column = 61 Number of columns = 1 Type = Numeric

Variable # 54 - 8. Electric sp. htrs.-how many units?
Start column = 62 Number of columns = 1 Type = Numeric

Variable # 55 - 8. LP or NG space htrs.- how many units?
Start column = 63 Number of columns = 1 Type = Numeric

Variable # 56 - 8. Wood burning stoves - how many units?
Start column = 64 Number of columns = 1 Type = Numeric

Variable # 57 - 8. Fireplace w/inserts - how many units?
Start column = 65 Number of columns = 1 Type = Numeric

Variable # 58 - 8. Fireplace w/o inserts - how many?
Start column = 66 Number of columns = 1 Type = Numeric

Variable # 59 - 8. Kerosene space htrs - how many units?
Start column = 67 Number of columns = 1 Type = Numeric

Variable # 60 - 9. What fuel for hot water heater?
Start column = 68 Number of columns = 1 Type = Numeric

1=electricity
2=oil
3=LP or NG
5=no heater
9=Other:APPENDIX I

Variable # 61 - 6. What type air conditioning in home?
Start column = 69 Number of columns = 1 Type = Numeric

1=no A/C
2=central A/C
3=window A/C

Variable # 62 - 6A. How many window A/C units?
Start column = 70 Number of columns = 1 Type = Numeric

Variable # 63 - 10a. Change of heating fuel - YEAR
Start column = 71 Number of columns = 2 Type = Numeric

Variable # 64 - Change of heating fuel-YEARS
Start column = 73 Number of columns = 1 Type = Numeric

1=before 75
2=75/76
3=77/78
4=79/80
5=81/82
6=83/84
7=85

Variable # 65 - 10a. Change in heating fuel - OLD FUEL
Start column = 74 Number of columns = 1 Type = Numeric

1=electricity
2=oil
3=LP
4=NG
5=wood
6=kerosene
7=coal
9=other

Variable # 66 - 10a. Change in heating fuel - NEW FUEL
Start column = 75 Number of columns = 1 Type = Numeric

1=electricity
2=oil
3=LP
4=NG
5=wood
6=kerosene
9=other

Variable # 67 - 10b. Change in hot water fuel - YEAR
Start column = 76 Number of columns = 2 Type = Numeric

Variable # 68 - Hot water fuel change-YEARS
Start column = 78 Number of columns = 1 Type = Numeric

1=before 75
2=75/76
3=77/78
4=79/80
5=81/82
6=83/84
7=85

Variable # 69 - 10b. Change in hot water fuel - OLD FUEL
Start column = 79 Number of columns = 1 Type = Numeric

1=electric
2=oil
3=LP
4=natural gas
5=wood
6=kerosene
7=no heater
9=other

Variable # 70 - 10b. Change in hot water fuel - NEW FUEL
Start column = 80 Number of columns = 1 Type = Numeric

1=electric
2=oil
3=LP
4=natural gas
5=wood
6=kerosene
9=other

Variable # 71 - 7a. What change in heating prac?-YEAR
Start column = 81 Number of columns = 2 Type = Numeric

99=no date

Variable # 72 - Heating practice change--YEARS
Start column = 83 Number of columns = 1 Type = Numeric

1=before 75
2=75/76
3=77/78
4=79/80
5=81/82
6=83/84
7=85
8=no date

Variable # 73 - 7a. Heating practices -DESCRIPTION
Start column = 84 Number of columns = 1 Type = Numeric

0=add electric
1=lowered thermst
2=wood heat
3=replace furnace
4=solar
5=insul/repair
6=gas/kero sp.htr.
7=heat pump
8=no description
9=Other:APPENDIX B

Variable # 74 - 7b. What change in cooling prac?-YEAR
Start column = 85 Number of columns = 2 Type = Numeric

99=no date

Variable # 75 - Cooling practice change-YEARS
Start column = 87 Number of columns = 1 Type = Numeric

1=before 75
2=75/76
3=77/78
4=79/80
5=81/82
6=83/84
7=85
8=no date

Variable # 76 - 7b. Cooling practices--DESCRIPTION.
Start column = 88 Number of columns = 1 Type = Numeric

0=new A/C
1=raised thermstat
2=rare use of A/C
4=fans
5=central A/C
6=insulation
8=no description
9=Other:APPENDIX C

Variable # 77 - 7c. Change in other appliance use: YEAR
Start column = 89 Number of columns = 2 Type = Numeric

99=no date

Variable # 78 - Appliance usage change-YEARS
Start column = 91 Number of columns = 1 Type = Numeric

1=before 75
2=75/76
3=77/78
4=79/80
5=81/82
6=83/84
7=85
8=no date

Variable # 79 - 7c. Other appliance usage-DESCRIPTION
Start column = 92 Number of columns = 1 Type = Numeric

1=stopped use
2=use energy effic
3=added appliance
5=el. to gas h.w.
6=el. to gas appl
7=gas to el.appl
8=no description
9=Other:APPENDIX D

Variable # 80 - 7d. Weatherstripping/caulking: YEAR
Start column = 93 Number of columns = 2 Type = Numeric

99=no date

Variable # 81 - Weatherization/caulking-YEARS
Start column = 95 Number of columns = 1 Type = Numeric

1=before 75
2=75/76
3=77/78
4=79/80
5=81/82
6=83/84
7=85
8=no date

Variable # 82 - 7d. Weatherstrip/caulking: DESCRIPTION.
Start column = 96 Number of columns = 1 Type = Numeric

1=weatherstripped
2=caulked
3=both ws & caulk
4=added insulation
5=added storm door
6=storm windows
7=storm drs & wind
8=no description
9=Other:APPENDIX E

Variable # 83 - 7e. What change in "Other"?--YEAR
Start column = 97 Number of columns = 2 Type = Numeric

99=no date

Variable # 84 - Other change-YEARS
Start column = 99 Number of columns = 1 Type = Numeric

1=before 75
2=75/76
3=77/78
4=79/80
5=81/82
6=83/84
7=85
8=no date

Variable # 85 - 7e. "Other" DESCRIPTION of change.
Start column = 100 Number of columns = 1 Type = Numeric

2=insul/repairs
3=storms
4=insul & storms
5=siding & storms
6=siding only
7=siding & insul
8=no description
9=Other:APPENDIX F

Variable # 86 - Total 1984 KWH from Coop on Resid. Meter
Start column = 101 Number of columns = 5 Type = Numeric

Variable # 87 - 11a. 1984 Electricity used (KWH).
Start column = 106 Number of columns = 6 Type = Numeric

Variable # 88 - 11a. 1984 $ paid for electricity.
Start column = 112 Number of columns = 5 Type = Numeric

Variable # 89 - 11b. 1984 oil used (Gallons).
Start column = 117 Number of columns = 5 Type = Numeric

Variable # 90 - 11b. 1984 $ paid for oil.
Start column = 122 Number of columns = 5 Type = Numeric

Variable # 91 - 11c. 1984 LP used (Gallons).
Start column = 127 Number of columns = 5 Type = Numeric

Variable # 92 - 11c. 1984 $ paid for LP.
Start column = 132 Number of columns = 5 Type = Numeric

Variable # 93 - 1984 Natural Gas used (Therms).
Start column = 137 Number of columns = 6 Type = Numeric

Variable # 94 - 11d. 1984 $ paid for natural gas.
Start column = 143 Number of columns = 5 Type = Numeric

Variable # 95 - 11e. 1984 amount of wood used (cords)
Start column = 148 Number of columns = 2 Type = Numeric

Variable # 96 - 11e. 1984 $ paid for wood.
Start column = 150 Number of columns = 4 Type = Numeric

Variable # 97 - 11f. Other fuel used: kerosene (gals).
Start column = 154 Number of columns = 3 Type = Numeric

Variable # 98 - 11f. 1984 $ cost of kerosene.
Start column = 157 Number of columns = 4 Type = Numeric

Variable # 99 - 11f. Other fuel used: coal (tons).
Start column = 161 Number of columns = 3 Type = Numeric

Variable # 100 - 11f. 1984 $ paid for Coal.
Start column = 164 Number of columns = 5 Type = Numeric

Variable # 101 - Unit Cost of Electricity
Start column = 169 Number of columns = 6 Type = Numeric

Variable # 102 - Unit Cost of Oil
Start column = 175 Number of columns = 5 Type = Numeric

Variable # 103 - Unit Cost of LP
Start column = 180 Number of columns = 5 Type = Numeric

Variable # 90 - 11b. 1984 $ paid for oil.
Start column = 122 Number of columns = 5 Type = Numeric

Variable # 91 - 11c. 1984 LP used (Gallons).
Start column = 127 Number of columns = 5 Type = Numeric

Variable # 92 - 11c. 1984 $ paid for LP.
Start column = 132 Number of columns = 5 Type = Numeric

Variable # 93 - 1984 Natural Gas used (Therms).
Start column = 137 Number of columns = 6 Type = Numeric

Variable # 94 - 11d. 1984 $ paid for natural gas.
Start column = 143 Number of columns = 5 Type = Numeric

Variable # 95 - 11e. 1984 amount of wood used (cords)
Start column = 148 Number of columns = 2 Type = Numeric

Variable # 96 - 11e. 1984 $ paid for wood.
Start column = 150 Number of columns = 4 Type = Numeric

Variable # 97 - 11f. Other fuel used: kerosene (gals).
Start column = 154 Number of columns = 3 Type = Numeric

Variable # 98 - 11f. 1984 $ cost of kerosene.
Start column = 157 Number of columns = 4 Type = Numeric

Variable # 99 - 11f. Other fuel used: coal (tons).
Start column = 161 Number of columns = 3 Type = Numeric

Variable # 100 - 11f. 1984 $ paid for Coal.
Start column = 164 Number of columns = 5 Type = Numeric

Variable # 101 - Unit Cost of Electricity
Start column = 169 Number of columns = 6 Type = Numeric

Variable # 102 - Unit Cost of Oil
Start column = 175 Number of columns = 5 Type = Numeric

Variable # 103 - Unit Cost of LP
Start column = 180 Number of columns = 5 Type = Numeric

Variable # 104 - Unit Cost of NG
Start column = 185 Number of columns = 5 Type = Numeric

Variable # 105 - Unit Cost of Wood
Start column = 190 Number of columns = 5 Type = Numeric

Variable # 106 - Unit Cost of Kerosene
Start column = 195 Number of columns = 4 Type = Numeric

G.3. Discussion of Selected Variables in REUSRC1.

We calculated V12 by assuming that each person in the 18-24 year old group was at the age midpoint, i.e., 21; each person in the 25-34 age group 29.5, and so on; an age of 78 was attributed to each person "over 75". Not surprisingly, the most common "average" ages fell on the 29.5, 39.5, 49.5 or 59.5 marks, because every one member family whose number was between 25 and 74 would fall precisely on such a point, as would two-adult families with two people in the same age category. The precise numbers are artificial, as are the spikes in the frequency distributions, e.g., DATA, p. 17.

In order to assign a variable value of 1,2,3, or 4 to Variable 22, the coder was responsible for making a judgment whether a respondent had placed either H, W, or S into any of the occupation status categories under the heading "FARMING" in Question 13 and whether the respondent had answered any of Questions 14-30.

Variable 23 subdivides farmers and non-farmers so that computations could be performed on appropriate subsets of respondents. (For example, it would be misleading to correlate total KWH to some farming operation without excluding from consideration those farmers who have no residential electric meter; such exclusion is facilitated by Variable 23). The detailed significance of the subsets of farmers and non-farmers has been described in Section 5.3.

Variable 25 was a classification of the comments offered on the back page of the Questionnaire. Category 2 refers to comments that

merely expanded on the Questionnaire itself. Category 3 represents comments appreciative of Coop performance. Categories 4-7 remarked on the high cost of electricity, with explicit criticism of the Coop, explicit reference to nuclear power as a supposed cause, or explicit reference to the Clinton plant, or "that new plant" but without explicit "nuclear" mention.

Variable 26 is the first of several which have a category "Other: Appendix A." Wherever such an appendix is mentioned, the contents of "other" were tabulated, and new categories created from common entries. The rest remain in such an appendix, now renumbered for the Question # and appearing at DATA pages 457-470.

The category "not checked" was distinguished in Variables 30-35 from blanks so that the few respondents who failed to check any of the parts of Question 5 could be distinguished. The working assumption was that these persons skipped the question and that the best measure of percentage use of conservation measures is obtained by restricting the sample to those with at least one item in Question 5 checked.

Variable 37 has the value 1 if the primary fuel in Question 8 was any of 01-05; 2 if V36 was either 06 or 07; 3 if V36 was 08; 4 if V36 was 09, 10, or 11 but not 12. The reason for excluding "fireplace without inserts" from "wood" is that such fireplaces are not really a heating method so much as an aesthetic choice, whereas a fireplace with an insert approximates a wood stove or a wood furnace as a genuine heating device.

Variable 52 may create some confusion. Since each variable can have only one value, the computation does not successfully handle cases in which two or more secondary fuels were checked. In fact the computation is such that where more than one secondary fuel was checked, Variable 52 takes the higher number -- for example, it lists as "kerosene" the secondary fuel of any respondent who checked both an electric system and kerosene as a secondary heat source. This problem has been corrected in Table 4, which takes explicit notice of multiple secondary heat sources.

Variables 64, 68, 72, 75, 78, 81 and 84 are each based on computations on the data in the preceding variable to aggregate the year reported into one of several two year intervals.

Variables 65 and 66 are not reliable means for distinguishing between LP and NG. Some respondents did distinguish, but many stated "gas" which was coded as NG. No undifferentiated category of "gas" was anticipated when inspection showed a number of more specified responses. Variable 65 and 66 were not considered in the preparation of Tables 26 and 27, or the discussion of LP and natural gas use in Section 2.5.

As discussed in Section 4.1, the categories for V73, 76, 79, 82 and 85 were established by identifying common themes in the responses that were initially recorded in Appendices B-F. The responses that remain unclassified are presented in DATA, pp. 458-461.

Variable 86 is the Coop-supplied electric use. Variables 87-100 are data from the respondents, where V97-V100, on kerosene and coal,

were initially reported as "other".

Variables 101-106 are computations, based on those respondents who supplied both an amount and a cost for the pertinent fuels. They were created primarily to identify possible data entry errors. In many cases, however, extremely high unit costs were consistent with the reported numbers and could be attributed to very small usage with high minimum billings.

APPENDIX G.4.

Codebook listing - REUSFC1

```
Variable # 1 - respondent #
Start column = 1     Number of columns = 3     Type = Numeric

------------------------------------------------------------
Variable # 2 - FARM QUESTIONS ANSWERED? ENERGY DATA?
Start column = 4     Number of columns = 1     Type = Numeric

          0=Residential only
          1=Farm
          2=F-no F.En.data
          3=F-no R.El.data
          4=Res.-new in '85
------------------------------------------------------------
Variable # 3 - Reliance on Farm Income
Start column = 5     Number of columns = 1     Type = Numeric

          1=Farm Income only
          2=F-T Farm + job
          3=P-T Farm + job
          4=retired P-T Farm
------------------------------------------------------------
Variable # 4 - Type of Production
Start column = 6     Number of columns = 1     Type = Numeric

          1=grain only
          2=grain+livestock
------------------------------------------------------------
Variable # 5 - 15a. Separate el.meter for crop drying?
Start column = 7     Number of columns = 1     Type = Numeric

          1=x'd
------------------------------------------------------------
Variable # 6 - 15b. Sep. meter for animal confinement?
Start column = 8     Number of columns = 1     Type = Numeric

          1=x'd
------------------------------------------------------------
Variable # 7 - 15c. Sep. meter for irrigation/pumping?
Start column = 9     Number of columns = 1     Type = Numeric

          1=x'd
------------------------------------------------------------
Variable # 8 - 15d. Sep. meter for other farm ops?
Start column = 10     Number of columns = 1     Type = Numeric

          1=x'd: APPENDIX R
          2=x'd, not specify
------------------------------------------------------------
Variable # 9 - 14a. Electricity for crop dry -mech.eqpt
Start column = 11     Number of columns = 1     Type = Numeric

          1=x'd
          2=not x'd
------------------------------------------------------------
```

Variable # 10 - 14b. Electricity for crop drying - heat.
Start column = 12 Number of columns = 1 Type = Numeric

1=x'd
2=not x'd

Variable # 11 - 14c. Ventilation for animal confinement.
Start column = 13 Number of columns = 1 Type = Numeric

1=x'd
2=not x'd

Variable # 12 - 14d. Space heat for animal confinement?
Start column = 14 Number of columns = 1 Type = Numeric

1=x'd
2=not x'd

Variable # 13 - 14e. Heat lamps for farrowing crates.
Start column = 15 Number of columns = 1 Type = Numeric

1=x'd
2=not x'd

Variable # 14 - 14f. Grinders for animal feed.
Start column = 16 Number of columns = 1 Type = Numeric

1=x'd
2=not x'd

Variable # 15 - 14g. Conveyors for animal feed.
Start column = 17 Number of columns = 1 Type = Numeric

1=x'd
2=not x'd

Variable # 16 - 14h. Walk-in refrigerator.
Start column = 18 Number of columns = 1 Type = Numeric

1=x'd
2=not x'd

Variable # 17 - 14i. Bulk milk tank - compressor.
Start column = 19 Number of columns = 1 Type = Numeric

1=x'd
2=not x'd

Variable # 18 - 14j. Automatic milker - compressor.
Start column = 20 Number of columns = 1 Type = Numeric

1=x'd
2=not x'd

Variable # 19 - 14k. Electric irrigation/water pumping.
Start column = 21 Number of columns = 1 Type = Numeric

1=x'd
2=not x'd

Variable # 20 - 141. Other electricity use for farm ops.
Start column = 22 Number of columns = 1 Type = Numeric

0=shop/pump/heat
1=APPENDIX Q
2=not x'd
3=pump
4=shop
5=equipment
6=heat
7=shop/pump
8=equipment/pump
9=pump/heat

Variable # 21 - 16a. 1984 gallons LP for crop drying.
Start column = 23 Number of columns = 5 Type = Numeric

Variable # 22 - 16b. Gals.LP for heat for animal confine
Start column = 28 Number of columns = 5 Type = Numeric

Variable # 23 - 16c. Gals.LP for irrigation/pumping.
Start column = 33 Number of columns = 5 Type = Numeric

Variable # 24 - 16d. Gals.LP for other farm operations.
Start column = 38 Number of columns = 5 Type = Numeric

Variable # 25 - 16e. Total 1984 gallons LP for farm use.
Start column = 43 Number of columns = 5 Type = Numeric

Variable # 26 - 17a. Gals.Diesel for contract off farm.
Start column = 48 Number of columns = 5 Type = Numeric

Variable # 27 - 17b. Gals.Diesel for field ops on farm.
Start column = 53 Number of columns = 5 Type = Numeric

Variable # 28 - 17c. Gals.Diesel for irrigation/pumping.
Start column = 58 Number of columns = 5 Type = Numeric

Variable # 29 - 17d. Gals.Diesel for other farm op.
Start column = 63 Number of columns = 5 Type = Numeric

Variable # 30 - 17e. Total 1984 gallons diesel for farm.
Start column = 68 Number of columns = 5 Type = Numeric

Variable # 31 - 17a. Gals.Gasoline for contract off farm
Start column = 73 Number of columns = 5 Type = Numeric

Variable # 32 - 17b. Gals.Gasoline for field ops on farm.
Start column = 78 Number of columns = 5 Type = Numeric

Variable # 33 - 17c. Gals.Gasoline for irrigation/pumping.
Start column = 83 Number of columns = 5 Type = Numeric

Variable # 34 - 17d. Gals.Gasoline for other farm ops.
Start column = 88 Number of columns = 5 Type = Numeric

Variable # 35 - 17e. Total 1984 gals.gasoline for farm.
Start column = 93 Number of columns = 5 Type = Numeric

Variable # 36 - 19a. Lbs. of nitrogen fertilizer in 1984
Start column = 98 Number of columns = 6 Type = Numeric

Variable # 37 - 19b. Lbs. of P205 fertilizer in 1984.
Start column = 104 Number of columns = 6 Type = Numeric

Variable # 38 - 19c. Lbs. of K20 fertilizer in 1984.
Start column = 110 Number of columns = 6 Type = Numeric

Variable # 39 - 21. Fert. or chem. for custom work?
Start column = 116 Number of columns = 1 Type = Numeric

1=no
2=yes

Variable # 40 - 22a. Livestock feed: corn in bushels.
Start column = 117 Number of columns = 5 Type = Numeric

00001=not in bu.

Variable # 41 - 22b. Soybean meal in lbs.
Start column = 122 Number of columns = 6 Type = Numeric

000001=not in lbs.

Variable # 42 - 22c. Feed supplement in lbs.
Start column = 128 Number of columns = 6 Type = Numeric

000001=not in lbs.

Variable # 43 - 22d. Other livestock feed purchased?
Start column = 134 Number of columns = 1 Type = Numeric

1=other:APPENDIX X

Variable # 44 - 27a. Tons solid manure produced.
Start column = 135 Number of columns = 4 Type = Numeric

Variable # 45 - 27a. Tons solid manure used as fertilizer
Start column = 139 Number of columns = 4 Type = Numeric

Variable # 46 - 27b. Gals.liquid manure produced.
Start column = 143 Number of columns = 6 Type = Numeric

Variable # 47 - 27b. Gals.liq.manure used as fertilizer.
Start column = 149 Number of columns = 6 Type = Numeric

Variable # 48 - 28. How processed manure?
Start column = 155 Number of columns = 1 Type = Numeric

1=composted
2=anaerobic
3=other

Variable # 49 - 30a. Corn - 1984 acreage.
Start column = 156 Number of columns = 4 Type = Numeric

Variable # 50 - 30a. Corn - usual acreage.
Start column = 160 Number of columns = 4 Type = Numeric

Variable # 51 - 30b. Soybeans - 1984 acreage.
Start column = 164 Number of columns = 4 Type = Numeric

Variable # 52 - 30b. Soybeans - usual acreage.
Start column = 168 Number of columns = 4 Type = Numeric

Variable # 53 - 30c. Other crop (first entry).
Start column = 172 Number of columns = 1 Type = Numeric

1=wheat
2=milo
3=corn silage
4=haylage
5=alfalfa
6=hay
7=fruit
8=vegetables
9=other: APP. AI

Variable # 54 - 30c. Other crop (1st entry) - 1984 acres
Start column = 173 Number of columns = 3 Type = Numeric

Variable # 55 - 30c. Other crop (1st) - usual acreage.
Start column = 176 Number of columns = 3 Type = Numeric

Variable # 56 - 30c(2). Other crop (2nd entry).
Start column = 179 Number of columns = 1 Type = Numeric

1=wheat
2=milo
3=corn silage
4=haylage
5=alfalfa
6=hay
7=fruit
8=vegetables
9=other: APP. AI

Variable # 57 - 30c(2). Other crop (2nd) - 1984 acreage.
Start column = 180 Number of columns = 3 Type = Numeric

Variable # 58 - 30c(2). Other crop (2nd) - usual acreage
Start column = 183 Number of columns = 3 Type = Numeric

Variable # 59 - 30c(3). Other crop (3rd entry).
Start column = 186 Number of columns = 1 Type = Numeric

1=wheat
2=milo
3=corn silage
4=haylage
5=alfalfa
6=hay
7=fruit
8=vegetables
9=other: APP. AI

Variable # 60 - 30c(3). Other crop (3rd) - 1984 acreage.
Start column = 187 Number of columns = 3 Type = Numeric

Variable # 61 - 30c(3). Other crop (3rd) - usual acreage.
Start column = 190 Number of columns = 3 Type = Numeric

Variable # 62 - Total 1984 Acreage Planted-excl. pasture
Start column = 193 Number of columns = 4 Type = Numeric

Variable # 63 - Total Usual Acreage Planted-excl.pasture
Start column = 197 Number of columns = 4 Type = Numeric

Variable # 64 - Total 1984 KWH from Coop on Resid. Meter
Start column = 201 Number of columns = 5 Type = Numeric

Variable # 65 - Total 1984 KWH from Coop on Second Meter
Start column = 206 Number of columns = 5 Type = Numeric

Variable # 66 - Wheat - 1984 Acreage
Start column = 211 Number of columns = 3 Type = Numeric

Variable # 67 - Wheat - Usual Acreage
Start column = 214 Number of columns = 3 Type = Numeric

Variable # 68 - 23g. Did you hire crop drying done?
Start column = 217 Number of columns = 1 Type = Numeric

1=x'd

Variable # 69 - Farm Ops. Fuel per Acre of Corn + Beans
Start column = 218 Number of columns = 4 Type = Numeric

Variable # 70 - 1984 KWH from Coop: Resid. + 2nd Meter
Start column = 222 Number of columns = 5 Type = Numeric

APPENDIX G.5.

Codebook listing - REUSFC2

Variable # 1 - respondent #
Start column = 1 Number of columns = 3 Type = Numeric

Variable # 2 - 18a. Type alt. energy for water heating.
Start column = 4 Number of columns = 1 Type = Numeric

1=solar
2=wind
3=biomass
4=wood

Variable # 3 - 18a. Year alt.energy for water heat inst
Start column = 5 Number of columns = 2 Type = Numeric

Variable # 4 - 18a. Cost of alt.energy for water heat.
Start column = 7 Number of columns = 5 Type = Numeric

Variable # 5 - 18a. % of water heating need by alt.en.
Start column = 12 Number of columns = 3 Type = Numeric

Variable # 6 - 18b. Type alt.energy for air heating.
Start column = 15 Number of columns = 1 Type = Numeric

1=solar
2=wind
3=biomass
4=wood

Variable # 7 - 18b. Year alt.energy for air heat instal
Start column = 16 Number of columns = 2 Type = Numeric

Variable # 8 - 18b. Cost of alt.energy for air heating.
Start column = 18 Number of columns = 5 Type = Numeric

Variable # 9 - 18b. % of air heating need by alt.energy
Start column = 23 Number of columns = 3 Type = Numeric

Variable # 10 - 23a. Did you hire preplanting work done?
Start column = 26 Number of columns = 1 Type = Numeric

1=x'd

Variable # 11 - 23b. Did you hire planting work done?
Start column = 27 Number of columns = 1 Type = Numeric

1=x'd

Variable # 12 - 23c. Did you hire fertilizer application
Start column = 28 Number of columns = 1 Type = Numeric

1=x'd

Variable # 13 - 23d. Did you hire chemical application?
Start column = 29 Number of columns = 1 Type = Numeric

1=x'd

Variable # 14 - 23e. Did you hire cultivation done?
Start column = 30 Number of columns = 1 Type = Numeric

1=x'd

Variable # 15 - 23f. Did you hire harvesting done?
Start column = 31 Number of columns = 1 Type = Numeric

1=x'd

Variable # 16 - 23g. Did you hire crop drying done?
Start column = 32 Number of columns = 1 Type = Numeric

1=x'd

Variable # 17 - 23h. Did you hire other custom work done
Start column = 33 Number of columns = 1 Type = Numeric

1=x'd: APPENDIX Y

Variable # 18 - 24. What is your usual crop rotation cyc
Start column = 34 Number of columns = 1 Type = Numeric

1=no rotation cycl
2=2 year cycle
3=3 year cycle
4=other cycle

Variable # 19 - 25. When & how, primary fertilizing?
Start column = 35 Number of columns = 1 Type = Numeric

1=fall broadcast
2=spring broadcast
3=spring band appl
4=f&sp bc.
5=f.bc.&sp.b.

Variable # 20 - 26. Soil test in either 83 or 84?
Start column = 36 Number of columns = 1 Type = Numeric

1=yes, 1983
2=yes, 1984
3=no
4=1983 and 1984

Variable # 21 - 29a. Plowing practice change--$ saved.
Start column = 37 Number of columns = 5 Type = Numeric

Variable # 22 - 29b. Cultivating prac. change--$ saved.
Start column = 42 Number of columns = 5 Type = Numeric

Variable # 23 - 29c. Irrigation prac. change--$ saved.
Start column = 47 Number of columns = 5 Type = Numeric

Variable # 24 - 29d. Fertilizing prac. change--$ saved.
Start column = 52 Number of columns = 5 Type = Numeric

Variable # 25 - 29e. Herbicide practice change--$ saved.
Start column = 57 Number of columns = 5 Type = Numeric

Variable # 26 - 29f. Pesticide prac.change--$ saved.
Start column = 62 Number of columns = 5 Type = Numeric

Variable # 27 - 29g. Crop drying prac.change--$ saved.
Start column = 67 Number of columns = 5 Type = Numeric

Variable # 28 - 29h. Livestock mgmt prac change--$ saved
Start column = 72 Number of columns = 5 Type = Numeric

Variable # 29 - 29i. Other op. practice change - $ saved
Start column = 77 Number of columns = 5 Type = Numeric

Variable # 30 - 29a. Plowing practice change - YEAR
Start column = 82 Number of columns = 2 Type = Numeric

Variable # 31 - 29b. Cultivating prac. change - YEAR.
Start column = 84 Number of columns = 2 Type = Numeric

Variable # 32 - 29c. Irrigation prac. change - YEAR.
Start column = 86 Number of columns = 2 Type = Numeric

Variable # 33 - 29d. Fertilizing practice change - YEAR.
Start column = 88 Number of columns = 2 Type = Numeric

Variable # 34 - 29e. Herbicide practice change - YEAR.
Start column = 90 Number of columns = 2 Type = Numeric

Variable # 35 - 29f. Pesticide practice change - YEAR.
Start column = 92 Number of columns = 2 Type = Numeric

Variable # 36 - 29g. Crop drying practice change - YEAR.
Start column = 94 Number of columns = 2 Type = Numeric

Variable # 37 - 29h. Livestock mgmt. prac. change - YEAR
Start column = 96 Number of columns = 2 Type = Numeric

Variable # 38 - 29i. Other op. practice change - YEAR.
Start column = 98 Number of columns = 2 Type = Numeric

G.6. Discussion of Selected Variables in REUSFC1 and REUSFC2.

Variable #2 is REUSRC1 Variable #23 imported into REUSFC1. Variables #3 and #4 are the investigators' judgment based on answers to Question 13, the open-ended comments to the unnumbered question, "How would you describe your farming operation?", acreage figures, answers regarding livestock needs (electric in Question 14, LP in Question 16b), and answers to Question 22 (feed for livestock) or to Question 27 (manure).

Variable 62 is the sum of V49, 51, 54, 57 and 60. Similarly, Variable 63 is the sum of V50, 52, 55, 58 and 61.

Variable 64 is the same as REUSRC1 Variable 86. Variable 65 includes, in a very small number of cases, an aggregation of several separate meters into a single "second" meter.

Variable 66 is the sum of V54, 57 and 60 in those cases only where the identifying variables V53, 56 or 59 have the value 1 ("wheat"). Variable 67 was calculated in the analogous manner.

Variable 68 was imported from REUSFC2 (Variable 16) in order to make correlations possible with other crop drying within REUSFC1.

The remainder of the variables in REUSFC1, including the computations of V69 and V70, as well as the variables in REUSFC2 are all transparent from the variable names.

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15. Supplementary Notes

16. Abstract (Limit: 200 words)

This project was undertaken by the Illinois Department of Energy and Natural Resources (IDENR) to study the energy use patterns of the rural population of West Central Illinois. The sample population for the study was composed of members of four rural electric cooperatives.

A major conclusion of this study is that there have been significant changes in energy use patterns in the population of West-Central Illinois in recent years. Five times as many changes occurred during 1983/84 as were made in the period 1975/76. These changes all appear to involve shifts which conserve energy or reduce costs.

The study was descriptive in nature and was designed to:
1. Develop and test a methodology for sampling energy use patterns in selected populations,
2. Describe energy use patterns of the residential and farming populations of rural West-Central Illinois, and
3. Determine major energy use changes which have taken place in that population in recent years.

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